Reelfoot and Lake Isom National Wildlife Refuges

Wildlife Inventory Plan

March 12, 2002

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INTRODUCTION

These procedures represent a cost effective inventory of the wildlife populations on Reelfoot and Lake Isom National Wildlife Refuges. The species selected for inventory were based on guidance provided in the Refuge Manual and the Regional Office memo of April 10, 1985 "Wildlife Inventory Plans". Most inventory procedures are integrated with other refuge wildlife management activities and studies to provide either an objective evaluation of that activity or additional management information concerning that activity. This plan represents the full scale of inventory needs at these two sites. At the current staff level not all inventories listed within this plan are being conducted. A full-time staff biologist is needed and has been requested through the RONS database, Project #99003.

Reelfoot National Wildlife Refuge is located on Reelfoot Lake in the northwest corner of Tennessee and southwest corner of Kentucky. The refuge was established in 1941 under the terms of a 75-year cooperative agreement with the State of Tennessee. Later, land purchases extended the refuge into Kentucky and increased the refuge to its present 10,428 acres. The refuge lies in the floodplain of the Mississippi River and is a major stopover point and wintering area for waterfowl of the Mississippi Flyway. Reelfoot Lake was formed by a series of violent earthquakes from December, 1811 to February, 1812. The refuge has managed the excellent natural habitats and enhanced the production of waterfowl foods through the introduction of a cooperative farming program. The Long Point Unit supports approximately 1,100 acres of agricultural cropland and 150 acres of moist-soil habitat for waterfowl. The Grassy Island Unit and portions of the Long Point Unit consist of forested wetlands, marsh, and open water. Forest management and water level management maintain these important waterfowl habitats.

Lake Isom National Wildlife Refuge was established by Presidential Proclamation in 1938 and is composed of 1,850 acres in northwest Tennessee. This acreage consists of croplands, open water, and woodlands. The refuge is owned in fee title and administered under Reelfoot NWR which is located fifteen miles to the north. Lake Isom NWR was established as a wintering area for migratory waterfowl using the Mississippi Flyway. Large numbers of geese, ducks, and bald eagles use the refuge during the winter. Numerous wood ducks also nest at Lake Isom during spring and summer. A wide variety of songbirds, mammals, reptiles, and amphibians also thrive on this small, but important refuge.

I. SPECIES LISTS

The refuges' Mammal List consists of fifty-three various marsupial, flying, rodent, carnivore, insectivore, and herbivore species. It is updated when new species are observed and documented. The following mammals have been documented on Reelfoot and Lake Isom NWR's:

Artiodactyla
White–tailed Deer

Carnivora
Raccoon
Longtail Weasel
Mink
River Otter
Spotted Skunk
Striped Skunk
Coyote
Red Fox
Gray Fox
Bobcat

Chiroptera
Little Brown Bat
Mississippi Bat
Gray Bat
Keen Bat
Indiana Bat
Small–footed Bat
Silver–haired Bat
Eastern Pipistrel
Big Brown Bat
Red Bat
Hoary Bat
Evening Bat
Eastern Big-eared Bat

Insectivora
Southeastern Shrew
Least Shrew
Shorttail Shrew
Eastern Mole

Xenarthra
Armadillo

Lagomorpha
Eastern Cottontail
Swamp Rabbit

Marsupialia
Opossum

Rodentia
Woodchuck
Eastern Chipmunk
Eastern Gray Squirrel
Eastern Fox Squirrel
Southern Flying Squirrel
Beaver
Eastern Harvest Mouse
Western Harvest Mouse
Deer Mouse
White–footed Mouse
Cotton Mouse
Golden Mouse
Eastern Woodrat
Rice Rat
Hispid Cotton Rat
Southern Bog Lemming
Prairie Vole
Pine Vole
Muskrat
Norway Rat
House Mouse
Meadow Jumping Mouse

The refuges' Amphibians and Reptiles List consists of seventy-five species. It is updated as needed with data collected within the Amphibian Monitoring Program. The following amphibians and reptiles have been documented on Reelfoot and Lake Isom NWR's:

Anura
Spoadefoot Toad
American Toad
Fowler's Toad
Cricket Frog
Spring Peeper
Green Treefrog
Gray Treefrog
Bird-voiced Treefrog
Upland Chorus Frog
Eastern Narrow-mouthed Toad
Bullfrog
Greenfrog
South Leopard Frog
Pickerel Frog
Crawfish Frog

Caudata
Mudpuppy
Three-toed Amphiuma
Lesser Siren
Mole Salamander
Marbled Salamander
Small-mouthed Salamander
Spotted Salamander
Tiger Salamander
Newt
Dusky Salamander
Zigzag Salamander
Slimy Salamander
Red Salamander
Two-lined Salamander
Long-tailed Salamander

Squamata Lacertilia
Fence Lizard
Six-lined Racerunner
Ground Skink
Five-lined Skink
Broad-head Skink
Slender Glass Lizard

Squamata Serpentes
Midwest Worm Snake
Western Mud Snake
Southern Black Racer
Rough Green Snake
Gray Rat Snake
Speckled King Snake
Red Milk Snake
Prairie King Snake
Northern Scarlet Snake
Southeastern Crowned Snake
Copperhead Snake
Western Cottonmouth Snake
Canebrake Rattlesnake
Green Water Snake
Diamondback Water Snake
Yellow-bellied Water Snake
Midland Water Snake
Broad-banded Water Snake
Midland Brown Snake
Northern Red-bellied Snake
Eastern Garter Snake
Eastern Ribbon Snake
Western Ribbon Snake
Smooth Earth Snake
Eastern Hognose Snake
Mississippi Ringneck Snake

Testudines
Common Snapping Turtle
Alligator Snapping Turtle
Stinkpot Turtle
Mud Turtle
Eastern Box Turtle
Mississippi Map Turtle
False Map Turtle
Red-eared Turtle
Slider
Missouri Slider
Southern Painted Turtle
Smooth Softshell Turtle
Spiny Softshell

The refuges' Bird List consists of 238 avian species. It is updated annually from data collected within the Breeding Bird Survey, Point Count Surveys, and the Christmas Bird Count. The following birds have been documented on Reelfoot and Lake Isom NWR's:

Anatidae
White-fronted Goose
Snow Goose
Canada Goose
Wood Duck
Green-winged Teal
American Black Duck
Mallard
Northern Shoveler
Gadwall
American Wigeon
Canvasback
Redhead
Ring-necked Duck
Whistling Swan
Lesser Scaup
Harlequin Duck
Old Squaw
White-winged Scoter
Common Goldeneye
Bufflehead
Hooded Merganser
Red-breasted Merganser
Ruddy Duck

Accipitridae
Bald Eagle
Sharp-shinned Hawk
Marsh Hawk
Cooper's Hawk
Red-shouldered Hawk
Broad-winged Hawk
Red-tailed Hawk
Rough-legged Hawk
Golden Eagle
American Kestrel
Peregrine Falcon
Mississippi Kite
Osprey

Alaudidae
Horned Lark

Alcedinidae
Belted Kingfisher

Apodidae
Chimney Swifts

Ardeidae
American Bittern
Least Bittern
Great Blue Heron
Great Egret
Snowy Egret
Little Blue Heron
Cattle Egret
Green-backed Heron
Black-crowned Night-Heron
Yellow-crowned Night-Heron

Bombycillidae
Cedar Waxwing

Caprimulgidae
Common Nighthawk
Chuck-will's-widow
Whip-poor-will

Cathartidae
Black Vulture
Turkey Vulture

Certhiidae
Brown Creeper

Charadriidae
Black-bellied Plover
Lesser Golden-Plover
Semipalmated Plover
Killdeer

Columbidae
Rock Dove
Mourning Dove

Cuculidae
Black-billed Cuckoo
Yellow-billed Cuckoo

Fringillidae
Dickcissel
Lapland Longspur
Dark-eyed Junco
Northern Cardinal
Purple Finch
Weaver Finch
American Goldfinch
Pine Siskin
Blue Grosbeak
Indigo Bunting
Rose-breasted Grosbeak
Rufous-sided Towhee
White-throated Sparrow
White-crowned Sparrow
Harris' Sparrow
Chipping Sparrow
Field Sparrow
Swamp Sparrow
American Tree Sparrow
Lark Sparrow
Grasshopper Sparrow
Fox Sparrow
Vesper Sparrow
Song Sparrow
Lincoln's Sparrow
Savannah Sparrow
Le Conte's Sparrow

Gaviidae
Common Loon
Pied–billed Grebe

Hirundinidae
Purple Martin
Tree Swallow
Northern Rough-winged
Swallow
Bank Swallow
American Crow
Fish Crow

Icteridae
Bobolink
Red-winged Blackbird
Eastern Meadowlark
Rusty Blackbird
Brewer's Blackbird
Common Grackle
Brown-headed Cowbird
Orchard Oriole
Northern Oriole

Laniidae
Loggerhead Shirk

Laridae
Franklin's Gull
Bonaparte's Gull
Ring-billed GullHerring Gull
Caspian Tern
Common Tern
Forster's Tern
Least Tern
Black Tern

Meleagrididae
Wild Turkey

Mimidae
Gray Catbird
Northern Mockingbird
Brown Thrasher

Motacillidae
American Pipit

Parulidae
Blue-winged Warbler
Golden-winged Warbler
Tennessee Warbler
Orange-crowned Warbler
Nashville Warbler
Northern Parula
Yellow Warbler
Chestnut-sided Warbler
Magnolia Warbler
Cape May Warbler
Yellow-rumped Warbler
Black-throated Green Warbler
Blackburnian Warbler
Yellow-throated Warbler
Pine Warbler
Prairie Warbler
Palm Warbler
Bay-breasted Warbler
Blackpoll Warbler
Cerulean Warbler

Pelecanidae
American White Pelican
Double-crested Cormorant
Anhinga

Phasianidae
Northern Bobwhite

Picidae
Red-headed Woodpecker
Red-bellied Woodpecker
Yellow-bellied Sapsucker
Downy Woodpecker
Hairy Woodpecker
Northern Flicker
Pileated Woodpecker

Ploceidae
House Sparrow

Podicipedidae
Grebe
Horned Grebe

Rallidae
King Rail
Virginia Rail
Sora
Purple Gallinule
Common Gallinule
American Coot

Scolopacidae
Greater Yellowlegs
Solitary Sandpiper
Willet
Spotted Sandpiper
Upland Sandpiper
Semipalmated Sandpiper
Least Sandpiper
Pectoral Sandpiper
Stilt Sandpiper
Short-billed Dowitcher
Common Snipe
American Woodcock

Sittidae
Red-breasted Nuthatch
White-breasted Nuthatch

Sturnidae
European Starling

Sylviidae
Golden-crowned Kinglet
Ruby-crowned Kinglet
Blue-gray Gnatcatcher

Thraupidae
Summer Tanager
Scarlet Tanager

Threskiornithidae
Wood Stork

Titmice
Carolina Chickadee
Tufted Titmouse
Trochilidae
Ruby-throated Hummingbird

Troglodytidae
Carolina Wren
Bewick's Wren
Long-billed Marsh Wren
House Wren
Short-billed Marsh Wren
Winter Wren

Turdidae
Eastern Bluebird
Veery
Gray-cheeked Thrush
Swainson's Thrush
Hermit Thrush
Wood Thrush
American Robin

Tyrannidae
Olive-sided Flycatcher
Eastern Wood-Pewee
Yellow-bellied Flycatcher
Acadian Flycatcher
Least Flycatcher
Eastern Phoebe
Great Crested Flycatcher
Eastern Kingbird

Tytonidae and Strigidae
Barn Owl
Eastern Screech-Owl
Great Horned Owl
Barred Owl
Short-eared Owl

Vireonidae
White-eyed Vireo
Solitary Vireo
Yellow-throated Vireo
Warbling Vireo
Philadelphia Vireo
Red-eyed Vireo
Black-and-white Warbler
American Redstart
Prothonotary Warbler
Worm-eating Warbler
Swainson's Warbler
Ovenbird
Northern Waterthrush
Louisiana Waterthrush
Kentucky Warbler
Cerulean Warbler
Connecticut Warbler
Common Yellowthroat
Hooded Warbler
Wilson's Warbler
Canada Warbler
Yellow-breasted Chat

II. CONSIDERATION OF SPECIES FOR INVENTORY AND MONITORING

Survey Procedure Form

Service Unit:	Reelfoot and Lake Isom National Wildlife Refuges
Reporting Office :	Reelfoot National Wildlife Refuge Complex
Procedure Number:	1
Species:	Anatidae (Waterfowl) and *Fulica americana* (American Coot)
Title:	Winter Ground Waterfowl Survey
Survey Type:	II and IV

I. Justification and Objectives

The management of migratory waterfowl is a major responsibility of the Fish and Wildlife Service. Reelfoot and Lake Isom National Wildlife Refuges were established for the primary purpose of providing wintering habitat for migratory waterfowl and are considered an important wintering area along the Mississippi Flyway. The refuge inventory effort, when combined with other state and federal waterfowl inventories, provides an important national base of information used to determine the distribution of waterfowl throughout the Mississippi Flyway.

II. Statistical Considerations

This survey will be conducted once in December and once in January. The January survey will be scheduled in close coordination with the Mid-Winter Waterfowl Survey during the first full work-week in January.

Due to the weather, water conditions and daily movements, the number of waterfowl present on the refuge will fluctuate greatly from day to day. Knowledge of duck use patterns in the area and other significant duck observations during the survey month will be used to extrapolate survey data and to estimate refuge waterfowl populations. Waterfowl populations are not extrapolated for the January Mid-winter Survey(only waterfowl seen are reported).

III. Data Collection Procedure

The survey should be conducted on clear or slightly overcast days; rain and high winds are to be avoided. Two observers familiar with the identification of waterfowl, capable of accurately estimating populations and knowledgeable of refuge geography are required. This is a ground survey. The route of travel will be a back and forth route throughout the refuges wherever accessible by boat or truck (Exhibit A). However, this is not a highly effective method, since the birds do not flush when concealed by the trees. If a large concentration of ducks is observed on any of these areas, a stop will be made to acquire a good estimate before continuing to the next area.

IV. Data Analysis and Reporting Procedures

The data will be used within output reports to determine shifts in waterfowl utilization and the Annual Narrative Report to compare waterfowl population trends with refuge objectives. Only the number of ducks observed will be recorded on the Waterfowl Population Summary(Exhibit B). Data for the Mid-Winter Waterfowl Survey

administered will be submitted to the Service Migratory Bird Field Coordinator stationed in Memphis Tennessee or the web-based Midwinter Waterfowl Survey Data Entry and Retrieval System.

V. Management Action Thresholds

N/A

VI. Data Storage Procedures

Data will be recorded on Exhibit B, the Waterfowl Population Summary. Computer data files are being developed by refuge staff at this time. Computer files will include all data from the data sheets and will be stored with the capability to import and export into an Ansi format. Data sheets will be filed under: WILDLIFE - Waterfowl Surveys - Refuges.

VII. Special Considerations

Every effort will be made to schedule a survey to coincide with the annual mid-winter waterfowl survey.

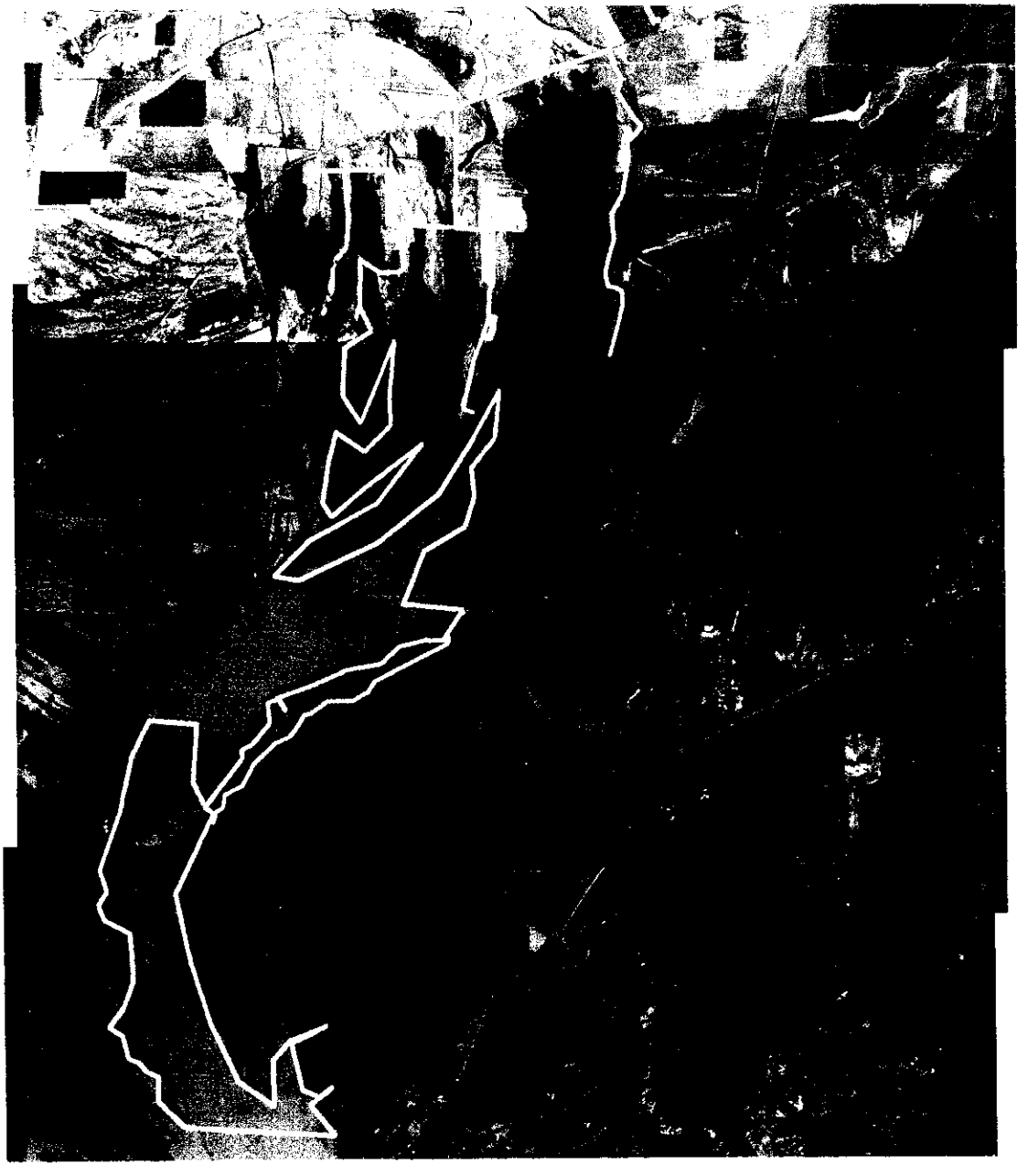
VIII. Literature Citations

N/A

IX. Effort and Costs

Personnel (4 staff days)	$ 910
Equipment	$ 450
Other Supplies	$ 100
Total	$1,460

Exhibit A page 1 of 2
Ground Waterfowl Survey Route Reelfoot NWR

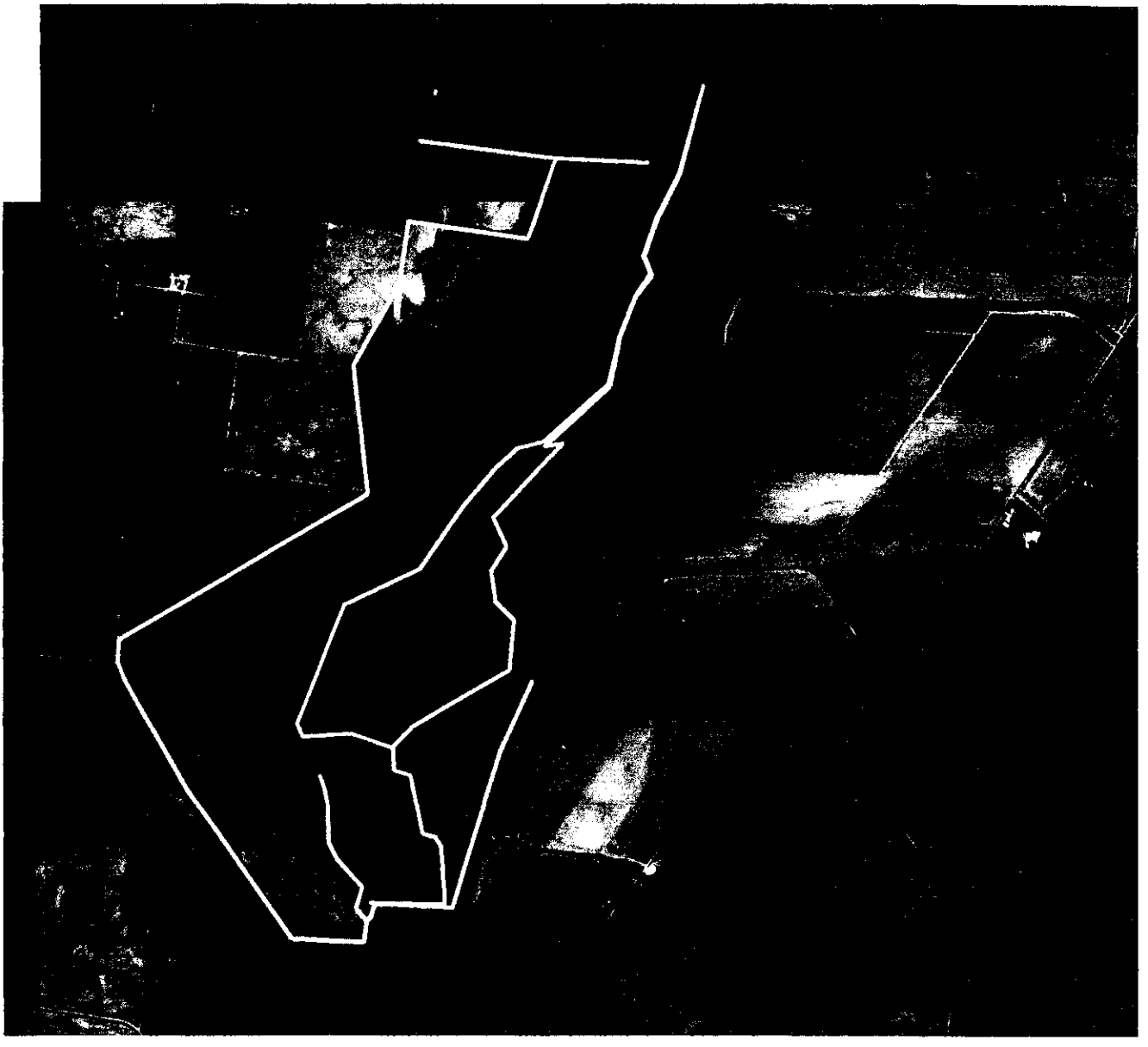


0 0.25 0.5 0.75 1 1.25 1.5 1.75 2 Miles

boat route
vehicle route

N

Exhibit A page 2 of 2
Ground Waterfowl Survey Route Lake Isom NWR



0 0.25 0.5 0.75 Miles

boat route
vehicle route

N

Reporter: _____

EXHIBIT B

WATERFOWL POPULATION SUMMARY

_____
Survey Date or Period

SPECIES	Reelfoot NWR	Lake Isom NWR	Total
_____ Swan . . .			
Canada Goose			
White-Fronted Goose . .			
Snow Goose			
Blue Goose			
Goose Total . . .			
Mallard			
Black Duck			
Gadwall			
American Widgeon . . .			
Pintail			
Green-Winged Teal . . .			
Blue-Winged Teal . . .			
Shoveler			
Wood Duck			
Redhead			
Ring-Necked Duck . . .			
Canvasback			
Scaup			
Common Goldeneye . . .			
Bufflehead			
Ruddy Duck			
Hooded Merganser . . .			
Common Merganser . . .			
Red-Breasted Merganser			
Other Duck			
Duck Total			
American Coot			

Totals: Swans _____ **Geese** _____ **Ducks** _____ **Coots** _____

Comments: _____

11/95

Survey Procedure Form

Service Unit:	Reelfoot and Lake Isom National Wildlife Refuges
Reporting Office :	Reelfoot National Wildlife Refuge Complex
Procedure Number:	2
Species:	Anatidae (Waterfowl) and *Fulica americana (*American Coot)
Title:	Aerial Waterfowl Survey
Survey Type:	II and IV

I. Justification and Objectives

The management of migratory waterfowl are a major responsibility of the Fish and Wildlife Service. Reelfoot and Lake Isom National Wildlife Refuges were established for the primary purpose of providing wintering habitat for migratory waterfowl. The entire Reelfoot Lake Area is considered an important wintering area along the Mississippi Flyway. The refuge inventory effort, when combined with other state and federal waterfowl inventories, provides an important national base of information used to determine the status of waterfowl.

II. Statistical Considerations

In order to examine population trends during the year and from year to year, a standardized aerial waterfowl survey will be conducted once in December and once in January. The January survey will be scheduled in close coordination with the Mid-Winter Waterfowl Survey during the first full week in January. Due to the weather, water conditions and daily movements, the number of waterfowl present on the refuge will fluctuate greatly from day to day. Only the number of ducks observed are recorded for this survey.

III. Data Collections Procedure

The aerial survey will begin no earlier than 0900 and will conclude before 1500. The survey should be conducted on clear or slightly overcast days; rain and high winds are to be avoided. Two observers familiar with the identification of waterfowl, capable of accurately estimating populations from the air and knowledgeable of refuge geography are required. The survey areas are divided into three units; Reelfoot and Lake Isom NWR's, Reelfoot and Black Bayou WMA's, and the Mississippi River. The route of travel for the waterfowl survey will be around boundaries then back and forth across large areas of the refuges and WMA's. The approximate routes for each are shown on Exhibit C. However, this is not a highly effective method, since the birds do not flush when concealed by the trees. If a large concentration of ducks is observed on any of these areas, the plane will circle the area until a good estimate is obtained before flying to the next area.

IV. Data Analysis and Reporting Procedures

Only the number of ducks observed will be recorded on the Waterfowl Population Summary (Exhibit B). The data will be used within output reports to determine shifts in waterfowl utilization and the Annual Narrative Report to compare waterfowl population trends with refuge objectives. Data will be submitted for the Mid-Winter Waterfowl Survey administered by the Service Migratory Bird Field Coordinator, Memphis TN.

V. Management Action Thresholds

N/A

VI. Data Storage Procedures

Data will be recorded on Exhibit B, Waterfowl Population Summary data form. Computer data files are being developed by refuge staff at this time. Computer files will include all data from the data sheets and will be stored with the capability to import and export into an Ansi format. Data sheets will be filed under: WILDLIFE - Waterfowl Surveys - Midwinter.

VII. Special Considerations

Every effort will be made to schedule flights to coincide with the annual mid-winter waterfowl survey. Since flight altitudes for the aerial surveys will be below 500 feet, personal protective equipment will be worn. Personal protective equipment requirements are outlined in OAS Operations Procedure Memorandum No. 85-1. Equipment required are protective head gear, fire retardant clothing, gloves, and all leather boots.

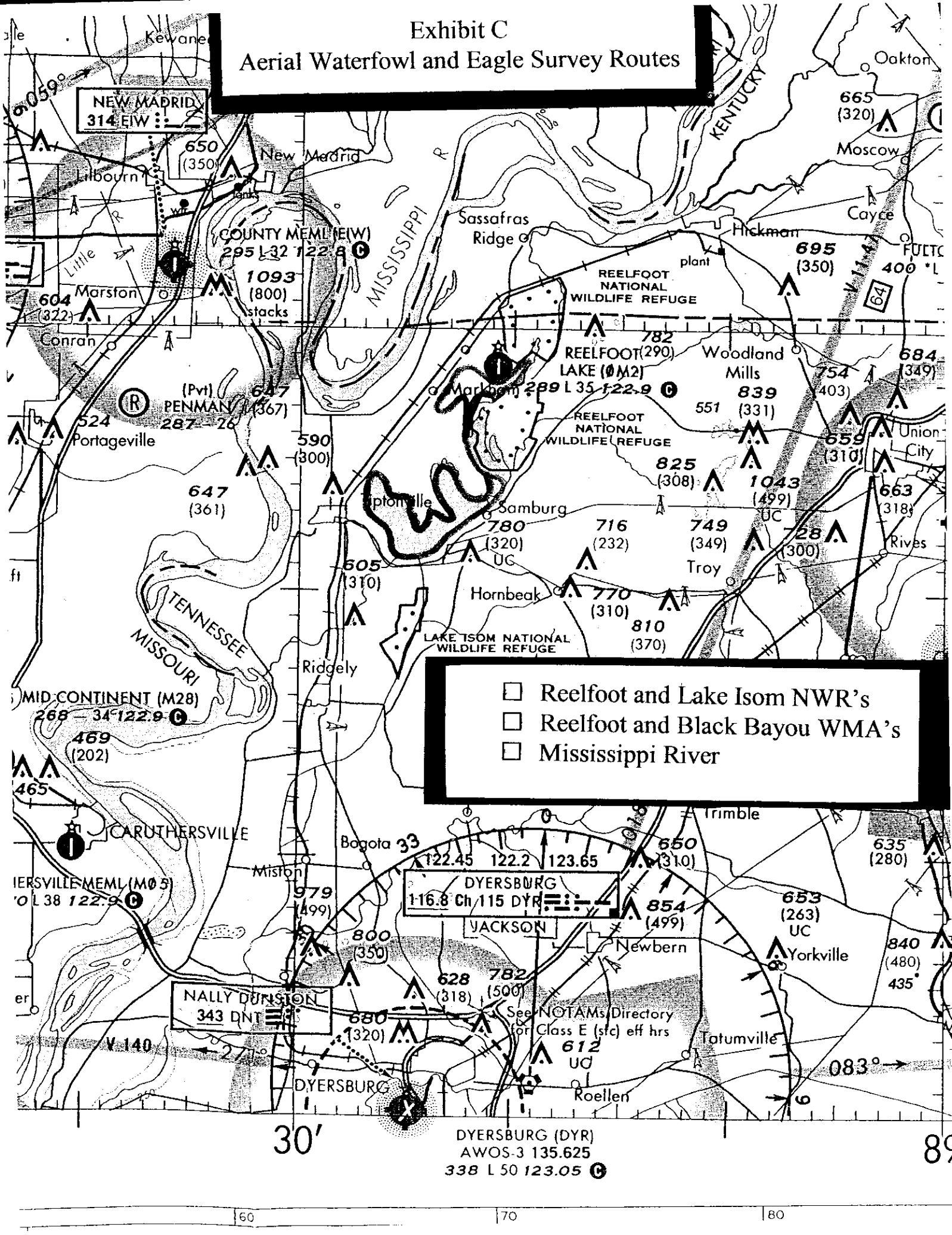
VIII. Literature Citations

N/A

IX. Efforts and Cost

Personnel (2 staff days)	$ 455
Equipment (aircraft rental 8 hrs @ $91/hr)	$ 728
Other Supplies	$ 100
Total	$1,283

Exhibit C
Aerial Waterfowl and Eagle Survey Routes



- ☐ Reelfoot and Lake Isom NWR's
- ☐ Reelfoot and Black Bayou WMA's
- ☐ Mississippi River

Survey Procedure Form

Service Unit:	Reelfoot and Lake Isom National Wildlife Refuges
Reporting Office :	Reelfoot National Wildlife Refuge Complex
Procedure Number:	3
Species:	*Aix sponsa* (Wood Duck)
Title:	Wood Duck Production (Nest Boxes)
Survey Type:	II and IV

I. Justification and Objectives

Reelfoot and Lake Isom Refuges were established for the primary purpose of providing habitat for migratory waterfowl. Wood duck nest boxes have been provided on these refuges for many years. The purpose of this survey is to document wood duck use of artificial nest boxes, record success, estimate young production and repair/replenish boxes. The refuge follows the guidelines set forth within A Guide to Wood Duck Production Habitat Requirements and the 1991 Region 4 Guidelines on Wood Duck Management Activities on Refuge Lands.

II. Statistical Considerations

Due to weather and staff availability, some boxes can not be checked monthly. Long Point Unit and Lake Isom may only be checked once per year. At that time, these boxes are cleaned, repaired, and membranes counted. When an exact count is unattainable, a total of 10 hatchlings is credited to that box for the prior year. Some requirements listed within the guide have been modified to meet the needs of wood ducks which have been determined through nesting trends and patterns.

III. Data Collection Procedure

Nest boxes on the Grassy Island Unit and Lake Isom are checked monthly beginning in April continuing until late July or early August. These inspections involve recording species use, tallying egg membranes, and banding hens when possible. Due to water levels, boxes on the Long Point Unit can only be inspected annually at best. All boxes are inspected in January or February as flood waters permit to record use, tally number of egg shells, make repairs and replenish nesting material before the nesting season. Data collections is best conducted by two individuals. The individuals must be able to operate an outboard motor, locate each nest box easily, identify a wood duck egg, and determine the stage of the nest. Data from nest box inspections is recorded on Exhibit D.

IV. Data Analysis and Reporting Procedures

Data is used to determine the success of wood duck production around Reelfoot and Lake Isom, to determine the relative effectiveness of the wood duck nest box program, to establish failures and successes of the wood duck box program as well as to estimate the need for expansion and alterations. Banded hens are reported within the Wood Duck Band Reports and all activity is reported annually within the Refuge Narrative Report.

V. Management Action Thresholds

Since a history has been established at Reelfoot and Lake Isom, sudden declines or increases within the area nesting population may be an indicator of habitat changes. To

determine the cause of the population change, research could be done on habitat gains or losses, food availability, air and water quality, hunting pressure, nest predation, pollution, diseases and parasites.

VI. Data Storage Procedures

Computer data files are being developed by refuge staff at this time. Computer files will include all data from the data sheets and will be stored with the capability to import and export into an Ansi format. All nest sites are being marked with GPS and stored for GIS mapping. Data sheets will be filed in the refuge files under WILDLIFE -Wood Duck Boxes.

VII. Special Considerations

Nest predation appears to be low. Currently, predator guards are made of sheet metal shaped like inverted cones. These guards will continue to be evaluated for effectiveness. If circumstances change, new types of predator guards will need to be developed.

VIII. Literature Citations

McGilvrey, Frank B. 1968. Wood Duck Production Habitat Requirements. U. S. Department of the Interior, Bureau of Sport Fisheries and Wildlife, Resource Publication 60, Washington, D. C.

IX. Efforts and Cost

Personnel (37.0 staff days)	$5,734
Equipment	$1,850
Supplies	$ 550
TOTAL	$8,134

Survey Procedure Form

Service Unit: Reelfoot and Lake Isom National Wildlife Refuges
Reporting Office : Reelfoot National Wildlife Refuge Complex
Procedure Number: 4
Species: *Aix sponsa* (Wood Duck)
Title: Wood Duck Banding
Survey Type: IV

I. Justification and Objectives

Reelfoot and Lake Isom Refuges were established for the primary purpose of providing habitat for migratory waterfowl. Wood ducks nest annually on the refuges. Wood ducks are banded at Reelfoot NWR in cooperation with the United States Fish and Wildlife Service, and the Canadian Wildlife Service. Each office is responsible for issuing of permits and bands, and collecting the banding data undertaken in its own country. Banding Permits are issued for management and research dedicated to the conservation of bird populations. Data generated by banding programs provides managers with estimates of survival and recovery rates that are useful in population monitoring.

II. Statistical Considerations

The success of the banding program is dependant on complete and accurate records. Age identification can be complicated later in the band cycle as the birds molt. When a bander is not sure, a more experienced bander should be consulted. Accuracy and timeliness in data reporting is essential to many banders and wildlife managers across the continent.

III. Data Collection Procedure

The Refuge follows the guidelines set forth within North American Bird Banding. Bird banding is done during the preseason period of July 1 - September 15. At this time, most young are at flight stage and are of adequate size for banding. Reelfoot NWR uses a rocket net method of capturing the birds. Beginning in June, wheat seed is spread along the waters edge near the banding site. As feeding progresses the wheat is spread closer and closer to the rocket net location. Once the birds are feeding on a regular basis in the desired location they can be captured. The rockets are set before sunrise and launched when a suitable number of birds are present on the site. After capture, it is very important to band quickly or to move the birds into a pen. The birds are under stress and need to be handled accordingly. If other species are captured in the net, they are released immediately.

The bander must be able to identify the age and sex of each bird. All banders must be properly trained by an experienced bander. Identification can be more complicated later in the banding cycle as the birds molt. When a bander is not sure, a more experienced bander should be consulted. All bands are identical and carry the return address of the U.S. Bird Banding Laboratory in Laurel, Maryland. The correct band size gives a comfortable fit when closed correctly. At Reelfoot NWR, the band size used for wood ducks is 6. It is very important to carefully and accurately attach the band with the ends aligning squarely. Improperly attached bands can cause injury or death to the bird. The band is placed around the tarsus with the band number closest to the birds body. Banding pliers are to be used. All other pliers are discouraged. Once the band is closed, the bander should make sure that the band moves freely around, up and down on the leg. An

overlapped or constrictive band must be removed and reapplied being extra careful not to injure the bird.

IV. Data Analysis and Reporting Procedures

Data is submitted to the U. S. Bird Banding Laboratory and is available for analysis. Individual identification of band recovery data allow for the study of dispersal and migration, life-span and survival rates, and reporting rates. Exhibit E is an example of a bird band schedule which this office submits after a banding cycle. Various other data is obtained from the individual that recovers or recaptures the bird. The Laboratory only stores and maintains data file. It does not analyze data.

V. Management Action Thresholds

Banding data is used to estimate survival, recovery rates, and to measure the vulnerability of the age/sex classes. Survival and recovery rates are useful in monitoring wood duck populations.

VI. Data Storage Procedures

Band data is stored using the Band Manager computer program developed by Bird Studies Canada. Band Manager is a windows type program developed exclusive for the management of bird banding data. Data is stored in a Summary Banding File Format. Band Manager stores band numbers, sex, age, band location, species, and recaptures. Band Manager performs many statistical summaries for each species filtered by various criteria. After inputting data, a Band Schedule is stored on floppy disk and printed on paper then both are mailed to the U.S. Bird Banding Laboratory in Laurel, Maryland. Banding data can be obtained from the U.S. Banding Laboratory as hard copy listing, floppy diskette, CD-Rom, on and individual basis or downloaded via File Transfer Protocol from the internet. Data sheets will be filed in the refuge files under WILDLIFE - Banding Schedules.

VII. Special Considerations

Banders assume responsibilities in following guidance from the Banding Offices as well as handling the birds properly. It is very important to attach the band carefully and accurately. Improperly attached bands can cause injury or death to the bird. How the birds are handled effects the bird's physical well being. All attempts to minimize the effects are crucial.

VIII. Literature Citations

_____. 1991. North American Bird Banding. U. S. Department of the Interior, U. S. Fish and Wildlife Service and Environment Canada, Canadian Wildlife Service, Minister of Supplies and Service, Ottawa, Ontario

IX. Efforts and Cost

Personnel (25.0 staff days)	$4,175
Equipment	$1,000
Supplies	$ 288
TOTAL	$5,463

EXHIBIT E

BANDING SCHEDULE

PERMIT# 06280 **PERMITTEE:** Jimmie Randy Cook

INCL 1026 - 78618
BANDS: THRU 78650

BANDING LOCATIONS
A Reelfoot NWR (Long Point unit, approx. 19 mi. north of Tiptonville,TN

BAND 1026 <-	COLOR MARKER	ALPHA CODE	Species Number	STAT	AGE-SEX	REG	LAT-LONG	DC	LOC	DATE
01										
02										
03										
04										
05										
06										
07										
08										
09										
10										
11										
12										
13										
14										
15										
16										
17										
78618		WODU	1440	333	AHY	F	282	363-0891	0	A	05-20-1999
19		"	"	"	"	"	"	" - "	"	"	"
20		"	"	"	"	"	"	" - "	"	"	"
21		"	"	"	"	"	"	" - "	"	"	"
22		"	"	"	"	"	"	" - "	"	"	"
23		"	"	"	"	"	"	" - "	"	"	"
24		"	"	"	"	"	"	" - "	"	"	"
25		"	"	"	"	"	"	" - "	"	"	"
26		"	"	"	"	"	"	" - "	"	"	"
27		"	"	"	"	"	"	" - "	"	"	06-18-1999
28		"	"	"	"	"	"	" - "	"	"	"
29		"	"	"	"	"	"	" - "	"	"	"
30		"	"	"	"	"	"	" - "	"	"	06-21-1999
31		"	"	"	"	"	"	" - "	"	"	"
32		"	"	"	"	"	"	" - "	"	"	"
33		"	"	"	"	"	"	" - "	"	"	06-25-1999
34		"	"	300	HY	M	"	" - "	"	"	07-22-1999
35		"	"	"	"	"	"	" - "	"	"	"
36		"	"	"	"	F	"	" - "	"	"	"
37		"	"	"	"	M	"	" - "	"	"	"
38		"	"	"	AHY	F	"	" - "	"	"	"
39		"	"	"	HY	"	"	" - "	"	"	"
40		"	"	"	"	M	"	" - "	"	"	"
41		"	"	"	AHY	"	"	" - "	"	"	"
42		"	"	"	"	"	"	" - "	"	"	"
43		"	"	"	"	F	"	" - "	"	"	"
44		"	"	"	HY	M	"	" - "	"	"	"
45		"	"	"	"	"	"	" - "	"	"	"
46		"	"	"	"	"	"	" - "	"	"	"
47		"	"	"	AHY	"	"	" - "	"	"	"
48		"	"	"	HY	"	"	" - "	"	"	"
49		"	"	"	AHY	"	"	" - "	"	"	"
78650		"	"	"	HY	F	"	" - "	"	"	"

REMARKS: Band Manager ver 2.1.

Survey Procedure Form

Service Unit: Reelfoot and Lake Isom National Wildlife Refuges
Reporting Office : Reelfoot National Wildlife Refuge Complex
Procedure Number: 5
Family: Anatidae Anserinae (Wintering Geese)
Title: Goose Collar Observations
Survey Type: IV

I. Justification and Objectives

The management of migratory waterfowl is a major responsibility of the Fish and Wildlife Service. Reelfoot and Lake Isom Refuges were established for the primary purpose of providing wintering habitat for migratory waterfowl. The entire Reelfoot Lake Area is considered an important wintering area along the Mississippi Flyway. This survey is conducted in cooperation with the Mississippi Flyway, and the Arctic Goose Joint Venture as a part of the North American Waterfowl Management Plan. This survey is to document the populations of geese wintering on the refuge. Goose collars are used to track migratory patterns of geese and study populations and trends.

II. Statistical Considerations

The birds are marked with varying colored neck collars inscribed with 2, 3, or 4 characters using various colors. Most Canada Geese are marked with 4 characters. Small subspecies of Canada, Snow, and White-fronted geese are marked with 3 characters. Collars with only two characters indicate a radio transmitter attachment. Collars attached under the Arctic Goose Joint Venture are 3-digit collars. The first character is vertical and the two following are horizontal. The species and colors in the joint venture are red, blue, yellow, orange, black, green, and pale blue. Within the Mississippi Flyway, orange and blue collars are predominately used. Orange collars are attached in the Canadian portion of the flyway and blue within the U.S. portion. Seeing the same geese over is favorable and should be recorded with each sighting. Observation effort should be distributed according to the population distribution. Optimum levels of observation are required to provide sufficient data for descriptions of population size, movement, and survival of neck banded geese.

III. Data Collection Procedure

Observations are made from the time the geese arrive until they depart. From mid-December until mid-February, high concentrations of geese are present on the Long Point Unit and moderate concentrations at Lake Isom NWR. Volunteers and staff survey areas of the refuge that support geese. Observation methods are dependent on the habitat, weather, and mannerisms of the geese. Rain distorts viewing, and heavy fog makes birds appear closer but may also blend the number. It is easiest to read large numbers of neckbands when the geese are feeding and loafing during midday. Having the sun on your back is recommended. It is best to observe geese from a vehicle. Good quality binoculars and scopes are used to look closely through the flocks for marked birds. A window mounted 0-60x or 0-45x spotting scope is recommended. Once located, the band information, species, location, time, date, etc., are recorded on the Attachments 6 and 7.

IV. Data Analysis and Reporting Procedures

Protocol for this survey is maintained by the U. S. Bird Banding Laboratory and the Canadian Wildlife Service. The different colors indicate separate flyways or special projects. Data is used to estimate populations of geese, refuge habitat usage, and migratory flight patterns throughout the continent. Information from Reelfoot and Lake Isom NWR goose populations is used for data analysis within the Mississippi Flyway. The completed forms are mailed to the following addresses:

Exhibit F:

Mr. Jeff Peterson
U. S. Fish & Wildlife Service

608 Cherry St., Room 119
Columbia, MO 65201

Exhibit G:

R. H. Kerbes
Canadian Wildlife Service
115 Perimeter Road
Saskatoon,
Saskatchewan
S7N 0X4, Canada

V. Management Action Thresholds

Goose collar observations provide critical data pertaining to the wintering habits of geese. Such data is used to estimate survival, recovery rates, and the vulnerability of the age/sex classes. Regulations can be altered dependent upon changes in waterfowl populations.

VI. Data Storage Procedures

The original forms are mailed to the appropriate agency and a copy is filed on site. Computer data files are being developed by refuge staff at this time. Computer files will include all data from the data sheets and will be stored with the capability to import and export into an Ansi format. Data can be obtained for statistical analysis from the U. S. Bird Banding Laboratory. Data sheets will be filed in the refuge files under WILDLIFE - Goose Neck Collar Observation Data.

VII. Special Considerations

Over time, collars may fade and/or become discolored or illegible. The observer will not record questionable colors or characters. The report should reflect the difficulty of reading the color and/or characters.

VIII. Literature Citations

Rusch, Donald H., Swenson, George W., and Sullivan, Brian D. 1990. A Manual for the Collection of Canada Goose Neckband Data in the Mississippi Flyway. Wisconsin Cooperative Wildlife Research Unit. Madison, WI.

IX. Effort and Costs

Personnel (9.0 staff days)	$1,503
Equipment	$ 100
Supplies	$ 100
TOTAL	$1,703

Aggregate Composition

___ *Giants*
___ *Interiors*
___ *Small Canadas*
___ *Mixed Flock*
___ *Unknown*

Observer: _____ Sheet _____ of _____ Observers Notes:

Refuge /GeneralArea: _____

Page *Date* *mo.* *da.* *yr.* *Latitude* *Longitude* *Time* *Total Marked* *Estimation of Total Examined* *Estimation of Total Present* *Activity Code* ~~*Observer Code*~~

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70

S F A C : S= subgroup; F= family; AC= activity code

Neck band observations:

S F A C 1 2 3 4 5 1 2 3 4 5 1 2 3 4 5 1 2 3 4 5 1 2 3 4 5 1 2 3 4 5 1 2 3 4 5 1 2 3 4 5 1 2 3 4 5 1 2 3 4 5 1 2 3 4 5

AC Avian Cholera, Recovery
CR Crippled
FC Found Collar
FD Found Dead with collar
IM Icing Mortality
IN Iced Collar - nothing done
IR Iced Collar - removed and released
LC Lost Collar
LP Lead Poisoning
OB Observed with Brood
ON Observed on Nest

PN Paired with Nesting Female
SH Shot Bird
UA Unknown Activity
01 Loafing on Water
02 Loafing on Land
03 Feeding in Standing Corn
04 Feeding in Alfalfa
05 Feeding in Soybeans
06 Feeding in Winter Wheat
07 Feeding in Plowed Field
08 Feeding in Water

09 Feeding in Corn Stubble
10 Loafing on Land or Water
11 Roosting
12 Feeding in Pasture
13 Loafing in Pasture
14 Feeding in Buckwheat
15 Feeding in Sweet Corn Stubble
16 Feeding in Silage Stubble
17 Feeding/Loafing in Wet Meadow
18 Loafing on Ice

19 Feeding in Standing Oats
20 Feeding in Rye
21 Feeding in Quack Grass
22 Feeding in Weeds
23 Recapture by: Rocket Nets - Ours
24 Recapture by: Rocket Nets - Others
25 Feeding in Clover
26 Feeding in Milo
27 Feeding in Mgmt. Moist Soil Unit

28 Feeding in Wheat Stubble
29 Feeding in Volunteer Wheat Stubble
30 Feeding in Red Clover
31 Feeding in PIK Acres
32 Feeding in Grain Stubble
33 Feeding in Soybean Stubble
34 Feeding on Lawn/Golf Course
35 Feeding on Milo Stubble
36 Feeding in Rice

37 Feeding in Lespedeza
38 Feeding on Banding Trap Site
39 Feeding on a Mud Flat
40 Feeding in Fescue
50 Feeding in Swathed Barley
51 Feeding in Barley Lure Crop
52 Feeding in Barley
53 Feeding in Silage Feedlot

54 In 1986-87 Data, Unknown
55 Feeding in Barley Stubble
56 Feeding on Bread From Public
57 Feeding
58 Feeding on grass
59 Feeding in Soybean Stubble-Disked
60 Feeding in Soybean Stubble-Dry
61 Feeding in Soybean Stubble-Flooded

62 Feeding in Rice- Disked
63 Feeding in Rice Stubble- Dry
64 Feeding in Rice Stubble-Flooded
65 Feeding in Rice Stubble-Rolled
66 Feeding in Cotton Stubble
67 Caught in Jack Miner trap

Richardsons collars:
> 2C = A2C1

Color codes

B = Blue/White
Z = Black/White
W = White/Black
O = Orange/Black
Q = Orange/White
R = Red/White
Y = Yellow/Black
G = Green/White

EXHIBIT F

EXHIBIT G

AGJV NECKBAND OBSERVATION FORM DATA CENTER USE

Name _____ Date ____/____/____ (yr/mo/da) Pg. ____

Agency _____ State/Prov. _____ County _____

Address _____ Location: _____

Telephone (___) _____ Lat _____ Long _____

Time Begin _____ Time End _____

FLOCK UNDER OBSERVATION MARKED/UNMARKED RATIO SAMPLES

Species	Estimated Number in Flock	Actual No. of Necks Examined	Ad. only	Ad. &yg	Color & No. of neckbands
W.FRONT					
SMALL CANADA					
SNOW					
ROSS'					
eg: W.FRONT	5000	478	✓		red 3; blue 2

Note: A marked/unmarked ratio sample = exact no. of necks (adults only, if possible) examined and the color and number of neckbands (if any) observed within that sample of necks.

NECKBAND DATA:
Includes those in above ratio sample and all others. Draw a line between paired birds.

eg:  =KA9  =TY81

Species	Neckband Color	Neckband Code	Draw Neckband	Comments
1.				
2.				
3.				
4.				

When completed, make and retain copy, send original to: R. H. Kerbes, Canadian Wildlife Service, 115 Perimeter Road, Saskatoon, Saskatchewan S7N 0X4, Canada

Survey Procedure Form

Service Unit:	Reelfoot and Lake Isom National Wildlife Refuges
Reporting Office :	Reelfoot National Wildlife Refuge Complex
Procedure Number:	6
Families:	Recurvirostridae, Charadriidae, & Scolopacidae
Title:	The International Shorebird Survey
Survey Type:	IV

I. Justification and Objectives

The Mississippi Alluvial Valley Migratory Bird Conservation Initiative is working to develop coordinated, complementary habitat goals for many migratory birds. Of the migratory birds within this initiative, the least is know about shorebirds. Large numbers of shorebirds migrate twice per year through the Mississippi Alluvial Valley, from their nesting grounds to their wintering grounds and back. Wet and bare fields are abundant during the spring migration yet the fall migration occurs during mid-July through October when most fields are covered with crops or dry from low rainfall. Mud flat areas for shorebirds during the fall are very limited. Consequently, the shorebird conservation initiative is concentrating on improvement to the fall migration habitat. In order to gain a more complete understanding of the numbers and chronology of shorebirds migrating through these areas, the following data is needed; reliable estimates of shorebird numbers across the region at intervals during migration and estimates of how long birds stop-over at a particular site.

II. Statistical Considerations

The Lower Mississippi Valley Joint Venture has coordinated an extensive research endeavor to further our knowledge of shorebird ecology in the Lower MAV. Biologists from Arkansas, Mississippi, Ducks Unlimited, and the Audubon Society are working with the Service to; coordinate a large-scale monitoring effort, develop a statistically sound survey design and methodology for estimating shorebird density, estimate turnover rates of shorebirds migrating through, document food availability, and develop spatial data to assist with monitoring efforts. At over 80 sites across 6 states, data has been collected for the past two years. Past data has proven to be a viable means of collecting population density. Continued success will allow biologist to develop strategies for meeting the initiative's goals.

III. Data Collection Procedure

This survey will follow the protocol already developed for the International Shorebird Survey through the Manomet Bird Observatory. At least one non-tidal, freshwater area will be surveyed for each unit (Long Point, Grassy Island, and Lake Isom). More than one area may be surveyed at Long Point and Lake Isom depending on the current year's rainfall. The survey will be conducted once during August and once during September. The dates for the surveys are specified by the LMV Joint Venture Office during the summer of each year. The surveyor must record the habitat type, time of day, and water level [normal (N), high (H), or low (L)] for each area. The surveyor needs to count each bird of each species when possible yet should estimate otherwise. Species identification is very important and population numbers should be divided by species whenever possible.

IV. Data Analysis and Reporting Procedures

Data forms will be provided each year from the LMV Joint Venture office prior to the survey dates. An example of the 2001 survey form is included as Exhibit H. Count Information and habitat type sections must be completed. The surveyor should be as specific as possible on the survey form. For example if the surveyor is not sure whether the flock is all one species or may be several species or subspecies then the population should be listed as species A/species B number X or family C number X. Family populations and number estimates should be indicated on the survey form as such.

The final data is reported to the LMVJV through the web site at www.lmvjv.org , email to: randy_wilson@fws.gov, faxed to 601-626-9541, or mailed to:

Randy Wilson,
Lower Mississippi Valley Joint Venture
2524 South Frontage Road
Vicksburg, MS 39180

All data will be documented within the Annual Narrative Report.

V. Management Action Thresholds

All actions will be developed as needed and will be coordinated with the Migratory Bird Joint Venture office to address habitat deficiencies present within the MAV.

VI. Data Storage Procedures

Observation records will be filed in the refuge files under WILDLIFE - Shorebird Surveys. Computer data files are being developed by refuge staff at this time. Computer files will include all data from the data sheets and will be stored with the capability to import and export into an Ansi format.

VII. Special Considerations

N/A

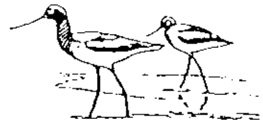
VIII. Literature Citations

N/A

IX. Effort and Costs

Personnel (1.0 staff days)	$ 167
Equipment	$ 50
Supplies	$ 10
TOTAL	$ 227

Lower Mississippi Valley Joint Venture
Shorebird Count Data Form - 2001



Count Information
Contact Name:
Phone / Email:
Count Date:
Time:
Weather Conditions:
Site Name:
State:
County/Parish:
Lat-Long (if known):
Distance and direction from public road:

Additional Observers
1.
2.
3.
4.
5.

Habitat Type	(check 1)
Managed	
Public Managed	
Private Managed	
Aquaculture	
Sewage Treatment	
Unmanaged	
Riverine / Sandbar	
Lake	
Roadside ditch	
Ephemeral	
Other	

Acres of Existing Shorebird Habitat or Miles of Shoreline:	

Shorebirds	Number
Am Golden-Plover	
Blk-bellied Plover	
Killdeer	
Piping Plover	
Semi-palm Plover	
Blk-necked Stilt	
American Avocet	
Gr Yellowlegs	
Le Yellowlegs	
Solitary SP	
Willet	
Spotted SP	
Upland SP	
Marbled Godwit	
Ruddy Turnstone	
Semi-palm SP	
Western SP	
Least SP	
PEEP	
White-rumped SP	
Baird's SP	
Pectoral SP	
Dunlin	
Stilt SP	
Buff-breasted SP	
SB Dowitcher	
LB Dowitcher	
DOWITCHER	
Common Snipe	
Am Woodcock	
Wilson's Phalarope	
*Small Sized Birds	
*Medium Sized Birds	
*Large Sized Birds	

Other Birds	Number

No. Banded Birds	
Description	

* Small = birds smaller than a Killdeer; Medium = birds larger than a Killdeer but smaller than a Black-necked Stilt; Large = Black-necked Stilts and larger.

Survey Procedure Form

Service Unit: Reelfoot and Lake Isom National Wildlife Refuges
Reporting Office : Reelfoot National Wildlife Refuge Complex
Procedure Number: 7
Species: *Haliaeetus leucocephalus* (Southern Bald Eagle)
Title: Bald Eagle Mid-Winter Survey
Survey Type: IV

I. Justification and Objectives

The Southern bald eagle is listed as a threatened species. Threatened and endangered species management, accountability, and protection are top priorities of all national wildlife refuges. This national survey has been the primary means for assessing winter populations of bald eagles in the United States for 24 years. This survey assesses the population trends of eagles and the geographic distribution of the birds at the time of the survey. Data generated from this survey has been critical in documenting the recovery of this species and will be strategic for monitoring the population after the species is de-listed.

II. Statistical Considerations

Four routes, designated as National Survey routes, are conducted at this station; the Mississippi River from Tiptonville north to the Tennessee state line, the Mississippi River from the Kentucky state line to Hickman, Reelfoot Lake, and Reelfoot NWR. These four surveys are used to analyze national population trends as well as regional and local trends. To qualify as a national route, the route must have been surveyed for the last consecutive four years resulting in at least four eagles recorded each year. Lake Isom is surveyed for refuge monitoring purposes.

III. Data Collection Procedures

This survey is done concurrent with the aerial waterfowl survey. The two target survey dates are set by the National Midwinter Eagle Survey Office each year. These dates are always within the first two weeks of January. The aerial survey will begin no earlier than 0900 and will conclude before 1500. The survey should be conducted on clear or slightly overcast days; rain and high winds are to be avoided. Two observers familiar with the identification of mature and immature eagles are required. The route of travel for this survey will be around boundaries then back and forth across large areas of the refuges and along each shoreline of the Mississippi River. The approximate routes for each are shown on Exhibit C.

IV. Data Analysis and Reporting Procedures

Only the number of eagles observed will be recorded on the Midwinter Bald Eagle Survey Standardized Survey Form (Exhibit I). During the survey, the surveyor is required to mark an X on the provided area map where each eagle is sited. Once completed, the survey forms and maps are mailed to both the TN and KY state offices:

TWRA, Nongame Coordinator
Ellington Agricultural Center
P. O. Box 40747
Nashville, TN 37204

Department of Fish and Wildlife
#1 Game Farm Road
Frankfort KY 40601-9986

V. Management Action Thresholds

N/A

VI. Data Storage Procedures

Copies of the completed survey forms and maps will be filed in refuge files under WILDLIFE - Eagle Mid-Winter Survey. Computer data files are being developed by refuge staff at this time. Computer files will include all data from the data sheets and will be stored with the capability to import and export into an Ansi format.

VII. Special Considerations

Any deviations from previous survey routes must be documented on the survey maps. Since flight altitudes for the aerial surveys will be below 500 feet, personal protective equipment will be worn. Personal protective equipment requirements are outlined in OAS Operations Procedure Memorandum No. 85-1. Equipment required are protective head gear, fire retardant clothing, gloves, and all leather boots.

VIII. Literature Citations

N/A

IX. Effort and Costs

Personnel (1.0 staff days)	$455
Equipment	$500
Supplies	$ 0
TOTAL	$955

MIDWINTER BALD EAGLE SURVEY
STANDARDIZED SURVEY FORM
2002

Note: Please complete *ALL* sections of this form (both front & back).

Office Use Only
Region: SE
Size Category: 4
Status: _____
Zone:

Survey Site Location

1. State: KY Survey Site Number: 01

2. Drainage or Body of Water: MISSISSIPPI RIVER

3. SiteName: MISSISSIPPI RIVER

4. County or Counties: _____

5. Start Point: _____

6. End Point: _____

7. Did this year's survey cover the same area that has been surveyed on this route in past years? (Circle One) **Y N**
If this year's survey covered more area than in past years, please report only the observations made along the traditional survey route on this form. If this survey covered less area than in past years, please describe how it differed in comments on next page

Survey Procedures

1. Survey Date: _____ 2. Time at Start: _____ 3. Total Time of Survey (minutes):_____

4. Roost or Nonroost 5. Continuous Route, Fixed Point, or Both 6. Total Miles Surveyed: _____*
Our records indicate this route covers approximately 76-150 miles of potential eagle habitat*(see back for explanation). If this is incorrect please explain in comments on next page.

7. Survey Method (*Circle All That Apply*): Road Vehicle Fixed Wing Helicopter Boat Skis

Foot Travel Snowmobile Fixed Point Vehicle/Fixed Point Other _____

Survey Results

1. Total Bald Eagles Counted: _____ No. of Adults: _____ No. of Immatures: _____
No. of Unknown Age: _____

2. Total Golden Eagles Counted: _____ No. of Adults: _____ No. of Immatures: _____
No. of Unknown Age: _____

3. Number of Unidentified Eagles Counted (*not identified to species*): _____

Observers

1. Name of Recorder _____ 2. No. of Observers _____

3. Address _____

City: _____ Zip _____ E-mail _____ Phone: ( )

4. Affiliation:

State Wildlife Agency _____
U.S. Fish & Wildlife Ser.
U.S. Forest Service
Tennessee Valley Authority
Private Organization or Citizen
U.S.G.S.
State (and Other) Parks
U.S. Army Corps of Engineers
National Park Service
Bureau of Land Management
Other Federal Agency
Other_____

OVER! (Complete Back Side)

Survey Procedure Form

Service Unit: Reelfoot and Lake Isom National Wildlife Refuges
Reporting Office : Reelfoot National Wildlife Refuge Complex
Procedure Number: 8
Species: *Odocoileus virginianus* (White-tailed Deer)
Title: Deer Herd Inventory
Survey Type: II

I. Justification and Objectives

The white-tailed deer is one of the most popular game animal found on the refuge and draws some interest from non-hunters. The deer is also a species that has the potential to damage the habitat for itself and other species on the refuge. To maintain the health of the refuge deer herd and keep the herd in balance with available habitat, it is desirable to control the deer population through public hunting. It is necessary to have adequate inventory information to properly manage the deer herd and monitor the refuge hunting program. With the intense interest in deer hunting from both hunters and non-hunters, it is also necessary to have sufficient biological information to support management decisions.

II. Statistical Considerations

It is not feasible to get a direct count of the refuge deer population. However, there are several proven techniques for monitoring deer herd health with a high degree of reliability. Deer harvest data is one source of valuable information. To obtain this data, the refuge will operate mandatory check stations during refuge gun hunts. During archery season, hunter survey stations will be maintained at each site and will be mandatory for each hunter after each visit. Hunter data is not always accurate and may go unreported. All efforts will be made by refuge staff to insure that hunters report all hunting activity conducted on the refuge.

III. Data Collection Procedure

The self check stations will be operated during archery hunts. The gun hunt check stations will be located at the main entrance of each unit and will be staffed by refuge personnel and volunteers. The following information will be collected on each deer brought to the check stations: sex, age, weight, location of kill, and the number of points. Obvious signs of disease, injury, external parasites, etc. are also noted and recorded.

Periodically (every 3-5 years), deer herd health checks are conducted to determine the levels of parasites, pathologic conditions, and the general physical parameters of the animals. This information plus the annual biological data collected will be used to monitor herd health.

IV. Data Analysis and Reporting Procedures

Data from the check stations will be summarized and reported on Deer Check Data Sheets (Exhibit J). The data will be compared to previous years to analyze population and hunter trends and changes. The Annual Hunt Report (Exhibit K) is submitted to the Project Leader and Regional Office after each completed hunt program.

V. Management Action Thresholds

Each managed hunting program on the refuge is analyzed in conjunction with the annual hunt reports. Dates, bag limits and permit numbers will be altered for each program as deemed necessary for the following year.

VI. Data Storage Procedures

The Annual Hunt Reports and Deer Check Data sheets will be filed under REFUGE MANAGEMENT - Deer Hunt Reports.

VII. Special Considerations

All personnel operating check stations will be competent in properly aging deer and gathering other data. Continuity of data from year to year is important and should be maintained through the annual hunt process. Browse observations will also be used to compare trends in populations.

VIII. Literature Citations

N/A

IX. Effort and Costs

Personnel (12.0 staff days)	$2,592
Equipment	$ 75
Other Supplies	$ 50
Total	$2,717

EXHIBIT J

Deer Check Data Sheets Reelfoot National Wildlife Refuge

Hunters Name	Sex	Age	Weight	Doe Reproduced	# points	Basal beam left	circumfr. Right

ANNUAL HUNT EVALUATION REPORT

Refuge: Reelfoot NWR **Hunting Season:** 11/17 & 18/2001
Species Hunted: White-tailed Deer
Type Hunt*: Quota Muzzleloader Deer Hunt

1. **Hunt Summary (attach map which indicates hunt area.)**

Acres open 10,428 **Days open** 1, 2-day hunt

Estimated hunter 4 Grassy/5 Long Point spent 52 hours **Animals harvested** 0
How were these estimates obtained?
Permits issued consisted of a hunter survey. From counts of vehicles and hunters during law enforcement patrol. All deer killed were required to be checked at refuge check stations.

Sex ratio (big game only) 0 males; 0 females

Permits required? yes **How issued?** public drawing
Hunter quotas? 30/unit, 2 units, $12.50 hunt fee

2. **Compatibility with Refuge Purposes--see 8RM5.3B(1) and discuss.**

The deer hunt is compatible with refuge purposes and in compliance with the National Wildlife Refuge System Administration Act of 1966, and the Refuge Recreation Act of 1962. The refuge is primarily a migratory waterfowl refuge but also attracts a large concentration of wintering bald eagles.

The hunting program benefits the refuge deer population by maintaining a desirable balance between deer numbers and the available food supply. The hunting of deer also reduces depredation losses of corn grown for waterfowl and soybean cash crops grown by the cooperative farmers. The hunts are conducted prior to the arrival of major concentrations of migrating waterfowl and eagles.

*** Make separate report for each type hunt within 30 days following close of season. (e.g., one report each for: all deer hunts, small game hunts, raccoon/opossum hunt, spring gobbler hunt, etc.)**

3. **Biological Soundness--8RM5.3B(2)**

Is there a harvestable surplus? Yes **Explain**

The deer population appears to be stable. Habitat degradation typically resulting from a deer population exceeding its carrying capacity is not evident on most of the upland areas of the refuge. No evidence of disease outbreaks and/or unusual mortality has been noted.

Is the level/health of the population adversely affected?
No **Explain**

Based on Southeastern Cooperative Wildlife Disease Study (SCWDS) results in 1997, the herd is presently in good physical condition, but the SCWDS also stated in 1997 that "any substantial increase in herd density will likely result in an increase in density dependent disease agents and declines in herd health".

Are other species adversely affected? No **Explain**

Other wildlife species including songbirds, ducks, wading birds, squirrels and other small mammals are temporarily disturbed by hunter activity during the deer hunt.

Is the hunt biologically sound? Yes **Explain**

Maintenance of a healthy herd, compatible with the available food supply, requires some method of controlling the annual increase created by natural reproduction. Regulated hunting as a tool to control undesirable increases is the accepted method.

4. **Economic Feasibility--8RM5.3B(3)**

Approximate staff costs: $1,600 **person days:** 4
overtime: 0
Other costs: (Describe) Vehicle fuel and oil $100

Possible cost reductions: none

5. **Conflicts with Other Refuge Objectives or Public Use--8RM5.3B(4)**

Conflicts between deer hunting and other refuge objectives and forms of public use, including wildlife observation, photography, fishing, and other hunting are not significant due to project scheduling, the large acreage of land open to multiple use, and time restrictions.

6. **Demand for Hunting--8RM5.3B(5)**

Is current demand being met? Yes

With several other deer hunts on adjacent public lands, the refuge deer hunts only add to an already good supply of hunting opportunities in the Reelfoot Lake area.

Can additional demand be met without compromising factors discussed in parts 2 to 5 above? Yes

As many as four days of hunting could theoretically be added without exceeding historical limits. If the deer population increases beyond the control capabilities of the current hunting pressure, additional hunt days may be in order. Lengthening the season, however, may have a negative effect on the number of wintering waterfowl that begin appearing about the same time as the deer hunt.

7. **Habitat Changes That Could Impact Wildlife Populations and Hunt Regulations:**

Through Natural Succession:

Plant succession favoring larger trees and reduced understory will not necessarily benefit the population. Mast production by oaks and agricultural crops of corn, wheat, and soybeans should continue to provide a stable food supply, barring any mast failures or sustained drought conditions.

From Management Actions:

Active cooperative farming serves as additional food supply.

8. **Hunt Problems or Complaints (Discuss)**

Change the hunt dates so it is not the same as the early weekend waterfowl season.

9. **Proposed Hunt Changes and Rationale**

As with the regular firearms hunt, applications exceeded permits available by nearly 5 times, however less than 50% of the permits were purchased by selected hunters. Due to the timing and weather, hunter participation was nearly non-existent. This hunt will be discontinued.

Submitted by: Deisha Norwood-Stampley Deisha Norwood-Stampley 12/10/01
ROS **Date**

Reviewed by: 12/10/01
Refuge Manager **Date** **District Biologist** **Date**

Approved by:

Project Leader **Date**

Survey Procedure Form

Service Unit: Reelfoot and Lake Isom National Wildlife Refuges
Reporting Office: Reelfoot NWR Complex
Procedure Number: 9
Species: *Meleagris gallopavo* (Eastern Wild Turkey)
Title: Turkey Survey
Survey Type: II

I. Justification and Objectives

The eastern wild turkey is hunted on the refuge. The information obtained from hunter surveys and state required check stations will be used to monitor the harvest level of the refuge population.

II. Statistical Considerations

Hunter survey cards will be mandatory for each hunter after each hunt season. Hunter data is not always accurate and may go unreported. All efforts will be made by refuge staff to insure that hunters report all hunting activity conducted on the refuge. Hunter surveys are being implemented for the first time in 2002. There is no history for comparison and reports can be unreliable. Data will be analyzed accordingly.

III. Data Collection Procedures

During one weekend in April, a quota hunt is conducted. Each hunter is required to fill out a refuge survey card and check the bird through a state designated check station. At the check station, weight, beard length, spur length, and location of kill are recorded.

IV. Data Analysis and Reporting Procedures

Data from the quota hunt is compiled in the Annual Hunt Report (Exhibit K). Reported data is used to determine how the flock is doing. This report is submitted to the Project Leader and Regional Office.

V. Management Action Thresholds

Each managed hunting program on the refuge is analyzed in conjunction with the annual hunt reports. Dates, bag limits, and permit numbers will be altered for each program as deemed necessary for the following year.

VI. Data Storage Procedures

Data sheets will be filed in the refuge files under REFUGE MANAGEMENT - Turkey Hunt Report.

VII. Special Considerations

N/A

VIII. Literature Citations

N/A

IX. Effort and Costs

Personnel (1.0 staff days)	$167
Equipment	$ 50
Other supplies	$ 10
Total	$202

Survey Procedure Form

Service Unit: Reelfoot and Lake Isom National Wildlife Refuges
Reporting Office: Reelfoot National Wildlife Refuge Complex
Procedure Number: 10
Species: *Sialia sialis* (Eastern Bluebird)
Title: Bluebird Production Survey (Nest Boxes)
Survey Type: II

I. Justification and Objectives

To document bluebird use of artificial nest boxes, record success, estimate young produced from boxes, and repair/replenish boxes.

II. Statistical Considerations

This is a new program at Reelfoot and Lake Isom. Changes in the nesting population will be documented for future analysis of habitat changes at Reelfoot and Lake Isom NWR's.

III. Data Collection Procedures

All nest boxes will be inspected three times annually to record use, document production, make repairs, clean, and disinfect. Data on the box use will be recorded on Exhibit L.

IV. Data Analysis and Reporting Procedures

Data will be used to determine the relative effectiveness of the nest box program and document true potential for additional nest boxes.

V. Management Action Thresholds

N/A

VI. Data Storage Procedures

Data sheets will be filed in the refuge files under WILDLIFE - Bluebird Nest Boxes. Computer data files are being developed by refuge staff at this time. Computer files will include all data from the data sheets and will be stored with the capability to import and export into an Ansi format. All nest sites are being marked with GPS used by Arcview GIS.

VII. Special Considerations

Nest predation appears to be low. If circumstances change, predator guards will need to be developed.

VIII. Literature Citations

N/A

IX. Effort and Costs

Personnel (10.0 staff days)	$1,710
Equipment	$ 20
Supplies	$ 175
TOTAL	$1,905

EXHIBIT L

Eastern Bluebird Nest Box Monitoring Program - Nest Box Check Database

Box #	Waypoint	Latitude	Longitude	Date	Use Species	# Eggs	# Live Nestlings	# Live Fledglings	Box Cleaned?
1	18	N36°19'14.7"	W089°25'14.5"						
5	20	N36°19'11.7"	W089°25'15.0"						
7	21	N36°26'58.1"	W089°17'56.2"						
9	1	N36°27'07.2"	W089°17'59.0"						
10	22	N36°27'03.6"	W089°17'56.2"						
12	101	N36°17'45.0"	W089°26'11.3"						
13	2	N36°27'05.1"	W089°18'00.9"						
15	102	N36°18'24.5"	W089°25'27.7"						
17	3	N36°27'06.1"	W089°18'02.8"						
19	19	N36°27'08.4"	W089°18'01.2"						
20	103	N36°18'36.0"	W089°25'25.5"						
25	4	N36°27'09.4"	W089°18'00.3"						
26	5	N36°27'11.3"	W089°18'04.4"						
29	6	N36°27'12.8"	W089°18'08.3"						
33	7	N36°30'54.0"	W089°19'16.4"						
35	8	N36°30'53.4"	W089°19'16.8"						
37	9	N36°30'52.6"	W089°19'18.0"						
45	10	N36°30'52.6"	W089°19'17.9"						
46	104	N36°31'40.6"	W089°18'03.4"						
50	25	N36°31'03.6"	W089°20'18.3"						
52	24	N36°30'55.4"	W089°20'20.0"						
53	23	N36°30'56.3"	W089°20'06.6"						
54	11	N36°30'13.4"	W089°18'54.8"						
63	12	N36°29'22.3"	W089°19'08.0"						
68	13	N36°30'34.7"	W089°19'37.4"						
69	14	N36°30'34.7"	W089°19'37.7"						
70	15	N36°30'56.3"	W089°20'06.8"						
88	16	N36°31'22.5"	W089°19'17.2"						
89	17	N36°31'38.4"	W089°18'25.1"						

Survey Procedure Form

Service Unit: Reelfoot and Lake Isom National Wildlife Refuges
Reporting Office : Reelfoot National Wildlife Refuge Complex
Procedure Number: 11
Species: All Birds
Title: Christmas Bird Count
Survey Type: IV

I. Justification and Objectives

The primary objective of this survey is to monitor the status and distribution of all bird populations across the Western Hemisphere. The period for conducting this survey is December 14-January 5th. Early winter is the period of late stage southward migration. Through the combination of this data with other surveys, conservationists can understand the changes of the continent's bird populations over the past hundred years. The Christmas Bird Count provides a forum to express recreational interest in birds during the winter season. Refuges use this information to maintain a list of bird species that use each particular refuge.

II. Statistical Considerations

This database consists of over a century of unbroken data on trends of early-winter bird populations. This data is available for local, state, or national analysis. This long history of information may indicate environmental trends(enhanced/detrimental), habitat changes(gains/losses), or immediate environmental conditions (drought, contamination, overpopulation, etc.) that need to be addressed by land managers.

III. Data Collection Procedures

The Christmas Bird Count is coordinated nationally by the Audubon Society. Each survey area takes a group of volunteers one day to complete. The refuge is included on such surveys. An Audubon Society volunteer directs and conducts this survey for the refuge. Refuge staff will assist as needed.

IV. Data Analysis and Reporting Procedures

The results of this survey are reported to the National Audubon Society by the observer. Survey results are also obtained from the observer for filing and analysis in this refuge office. The Christmas Bird Count results are compiled into the longest running database in ornithology. The data collected is analyzed and compared to previous years' surveys both on a local and national basis by the Audubon Society. A list of species not previously recorded on the refuge will be maintained and added to the next revision of the refuge bird list brochure.

V. Management Action Thresholds

Since a history has been established at Reelfoot, sudden declines or increases within the area population may indicate habitat changes. To determine the cause of the change, research could be done on habitat gains or losses, food availability, air and water quality, hunting pressure, pollution, diseases, and parasites.

VI. Data Storage Procedures

Data history is maintained by the Audubon Society database. This information can be assessed from the web at http://www.audubon.org/bird/cbc. A copy of the data obtained from the Christmas Bird Count is filed in refuge files under WILDLIFE - Christmas Bird Count.

VII. Special Considerations

N/A

VIII. Literature Citations

N/A

IX. Effort and Costs

Personnel (.5 staff days)	$ 86
Equipment	$ 20
Other Supplies	$ 25
Total	$131

Survey Procedure Form

Service Unit: Reelfoot and Lake Isom National Wildlife Refuges
Reporting Office : Reelfoot National Wildlife Refuge Complex
Procedure Number: 12
Species: All Seasonal Nesting Birds
Title: American Breeding Bird Survey
Survey Type: VI

I. Justification and Objectives

Breeding birds are of interest to the U. S. Fish and Wildlife Service, particularly from the standpoint of determining which species nest and produce young on each refuge. It is also important to know which bird species occur but do not nest on a particular refuge. The information gained from this survey will be used to determine species of birds breeding in forest stands of known vegetation and in a known landscape.

II. Statistical Considerations

In order for the accurate analysis of results, it is essential that the observer adhere strictly to the guidelines for conducting this survey. If a site is unable to conduct a survey, the state coordinator must be notified immediately.

III. Data Collection Procedures

This census should be done mid-June along secondary roads and trails. Stations should be spaced 250m apart for a total of 50 stations. The same exact stations should be surveyed each year and in the same order. Observations should be done outside the vehicle in a stationary location. The observer should remain very still and quiet. Every bird seen within 1/4 mile (400m) and every bird heard within 3 minutes should be recorded. Record all birds only once. Only estimate flocks too large to count quickly. Data collection sheets are provided as needed by USGS. Any subspecies identified but not listed on the form should be added at the bottom. Any non-breeding migrant bird should be listed on the form as such. Any unusually occurring species should be listed on the form along with details of the observation.

IV. Data Analysis and Reporting Procedures

All data sheets and field notes are submitted to the Survey coordinator through the email or US mail to the state coordinator at:

TVA, cpnicholson@tva.gov
400 West Summit Hill Dr., WT 8C-K 865-632-3582
Knoxville, TN 37902-1499

or via the internet at http://www.mp2-pwrc.usgs.gov/bbs/. All data forms must be completed and returned or entered by July 15. Once the data is processed, a machine generated list will be mailed to the observer. Data on distribution trends and comparative abundance of individual species are available from the research center upon request. This data is included in the Annual Narrative Report and used on output reports.

V. Management Action Thresholds

Sudden declines or increases within the area population can be used as an indicator of habitat changes. To determine the cause of the change, research could be conducted on habitat gains or losses, food availability, air and water quality, hunting pressure, pollution, diseases, and parasites.

VI. Data Storage Procedures

Data should be stored in a database management/GIS system. Observation records will be filed in the refuge files under WILDLIFE - Breeding Bird Survey. Computer data files are being developed by refuge staff at this time. Computer files will include all data from the data sheets and will be stored with the capability to import and export into an Ansi format.

VII. Special Considerations

The observer must know the songs, calls, and visual identification of all species that may be encountered. A songbird cassette is available from USGS Patuxent Wildlife Research Center. First time observers should conduct a practice run to insure accuracy and knowledge of the route. Breeding counts should be done before 10 AM and avoid inclement weather.

VIII. Literature Citations

N/A

IX. Effort and Costs

Personnel (2 staff days)	$334
Equipment	$100
Other Supplies	$100
Total	$534

Survey Procedure Form

Service Unit:	Reelfoot and Lake Isom National Wildlife Refuges
Reporting Office :	Reelfoot National Wildlife Refuge Complex
Procedure Number:	13
Species:	Passerine Birds
Title:	Point Count Surveys
Survey Type:	II

I. Justification and Objectives

Passerine birds are of interest to the Fish and Wildlife Service, particularly from the standpoint of determining which species utilize the refuge as stopovers locations. It is also important to know which bird species do not occur on a particular refuge. The information gained from this survey will be used to determine species of birds which occur during brief periods of the spring and fall. These are the species of bird which are not present during the Christmas Bird Count or the Breeding Bird Count yet utilize the refuge for some time of the year.

II. Statistical Considerations

In order for the accurate analysis of results, it is essential that the observer follow the guidelines for conducting this survey very accurately. If a site is unable to conduct a survey, the state coordinator must be notified immediately.

III. Data Collection Procedures

This census should be done once during the early spring and once during early fall (mid-March, mid- October) along secondary roads and trails. Stations should be spaced 250m apart. A minimum of 100 stations should be surveyed with a minium of 10 habitat types included. It is better to increase # of stations than to repeatedly count a smaller number of stations. Once the route is developed, habitat data should be collected at each station and recorded on Exhibit M. A GPS route map with directions and habitat data should be maintained at the refuge office. A copy should be carried by the observer. All data collection should be done by the same individual. One observer can do approximately 25 stations/day for five minutes at each station. Counts should begin at sunrise and end when activity noticeably diminishes. The observer should record all birds only once. Separate the birds as; 1) seen or heard within the first 3 minutes, 2) heard within the 4^{th} & 5^{th} minutes, 3) heard with the remaining minutes, 4) within 50 m, 5) farther than 50 m. Data should be recorded on Exhibit N.

IV. Data Analysis and Reporting Procedures

The final data is entered into the Automated Bird Management Database. This database allows for analysis through various queries for one refuge or several refuges. Analysis will be used for the Annual Narrative Report and various output reports.

V. Management Action Thresholds

Sudden declines or increases within the area population may be used as an indicator of habitat changes. To determine the cause of the change, research could be done on habitat gains or losses, food availability, air and water quality, hunting pressure, pollution, diseases, and parasites.

VI. Data Storage Procedures

Data will be stored in the ABM database. Observation records will be filed in the refuge files under WILDLIFE - Point Count Survey.

VII. Special Considerations

The observer must know the songs, calls, and visual identification of all species that may be encountered. A songbird cassette is available from USGS Patuxent Wildlife Research Center. First time observers should conduct a practice run to insure accuracy and knowledge of the route. Breeding counts should be done before 10 AM and should not be done in the rain or when the wind exceeds 12 mph.

VIII. Literature Citations

Hamel, Paul, et al. 1996 A Land Manager's Guide to Point Counts of Birds in the Southeast, General Technical Report SO-120, Department of Agriculture, U.S. Forest Service, Asheville, NC.

IX. Effort and Costs

Personnel (4 staff days)	$668
Equipment	$100
Other Supplies	$100
Total	$868

EXHIBIT M

Partners in Flight Point Count Monitoring
VEGETATION DATA SHEET

Date _____

Observer _____

Area _____ Station Number _____

Elevation: _____ **Aspect:** _____ **Slope:** ___ 0-5° ___ 6-44° ___ ≥45°

Water: _____ absent _____ standing _____ fresh **Forest Type** _____

_____ within 50m _____ flowing _____ brackish **Acres** _____

_____ 51-100m _____ salt:

Canopy/Overstory

Dominant Vegetation: Conifer _____

Hardwood _____

Tree Height: Actual _____ Estimated ____ <20 ft ____ 20-50 ft ____ 50-100 ft ____ >100 ft

Basal Area _____ (thumb/prism) **% Canopy Cover** ___ 0 ___ 1-25 ___ 26-50 ___ 51-75 ___76-100

Midstory ..... >10 feet

Dominant Vegetation: Conifer _____

Deciduous _____

Evergreen _____

% Canopy Cover ___ 0% ___ 1-25% ___ 26-50% ___ 51-75% ___76-100%

Shrub Layer/Understory ..... 3-10 feet

Dominant Vegetation: Conifer _____

Deciduous _____

Evergreen _____

% Canopy Cover ___ 0% ___ 1-25% ___ 26-50% ___ 51-75% ___76-100%

Herbaceous Layer/Groundcover

Dominant Vegetation: Woody Plants _____

Grass/sedge _____ Ferns _____

Broadleaf herb/forb _____ Moss/lichen _____

Percent Groundcover (total) ___ 0% ___ 1-25% ___ 26-50% ___ 51-75% ___76-100%

Percent of Groundcover in Grasses ___ 0% ___ 1-25% ___ 26-50% ___ 51-75% ___76-100%

Area not covered by herbaceous plants ____ leaf litter ____ bare dirt ____ rock ____ standing water _____ moist/boggy

_____

Other (within 50m plot)

Snags Standing _____ # 12 - 20 inches dbh _____ # >20 inches dbh

Live Cavity Trees _____ # 12 - 20 inches dbh _____ # >20 inches dbh

Spanish Moss ____ yes ____ no **Vines** (that cross vegetation layers) ____ yes ____ no

Comments: _____

_____

_____

vegetation layers

EXHIBIT N

State Region Station Point # Visit # Year Month Day Time

Observer Temp °C Wind Sky Habitat Forest type Stage Zone N-S coordinates E-W coordinates
Geographic coding: Zone=0 for lat-long, else UTM Zone

Species Alpha Code	Count < 25 m			25-50 m			> 50 m			Flyovers		
	0-3 min	4-5 min	6-10 min	0-3 min	4-5 min	6-10 min	0-3 min	4-5 min	6-10 min	0-3 min	4-5 min	6-10 min

Submitter Remarks

Survey Procedure Form

Service Unit: Reelfoot and Lake Isom National Wildlife Refuges
Reporting Office : Reelfoot National Wildlife Refuge Complex
Procedure Number: 14
Order: Anura
Title: Tennessee Amphibian Monitoring Program (TAMP)
Survey Type: IV

I. Justification and Objectives

TAMP is a division of the National Amphibian Monitory Program. The NAAMP is a collaborative effort among regional partners, such as state natural resource agencies and nonprofit organizations, and the U.S. Geological Survey (USGS) to monitor populations of vocal amphibians. The USGS provides central coordination and database management. In recent years, biologists in many parts of the world have documented declining populations of amphibians, especially anurans (frogs & toads). It is speculated that some declines may be the result of pollution, predation by introduced species, unfavorable changes in land and water use, habitat destruction, climatic changes, inappropriate use of pesticides and herbicides, and holes in the ozone layer. Some declines may simply be a natural, though seemingly unfortunate, cycle of many populations. It is because of these concerns that the program was developed. Amphibians are believed to be an indicator of subtle habitat changes which can be determined through monitoring.

II. Statistical Considerations

Amphibian population data are collected using a calling survey technique, in which observers identify local amphibian species by their unique vocalizations. Not all amphibian species make vocalizations, but many frogs and toads do. Observers are trained to identify their local species by these unique vocalizations or "frog calls."

III. Data Collection Procedures

In Tennessee, the anuran surveys are divided into three types, including; roadside counts, fixed-point monitoring, and incidental observations. Each of these has a slightly different purpose and protocol (directions) and when used together will help mend the gaps in the knowledge available about anurans.

Roadside counts are perhaps the easiest and quickest method of acquiring data about breeding anurans, because many sites may be visited in a short time, and a variety of species are likely to be heard. To set up a road route the observer(s) must examine the route during the daytime beginning at the pre-selected starting point. From this starting point, the "Froglogger" should record the travel distance to the first ten wetlands in sequence. Wetlands can include ponds, temporary pools, ditches, etc...basically any site which holds some standing water at some time. Each wetland must be at least 500 meters (1/3 mile) apart from the next site. This insures that you do not hear overlapping calls from two adjacent listening posts. Wetlands can be on either side of the road. As each wetland is selected, map it with an "X" on the map provided. Once the listening posts have been set, a map needs to be submitted to the Regional Coordinator. The coordinator will then mail out data sheet periodically.

To run the route, begin at the first listening post one-half hour after dusk and complete the survey within two hours. If the wetland is immediately adjacent to the road, approach

the listening post cautiously, listening for frogs and toads as you approach. The routes should be run during periods of high humidity or shortly after a rain.

After arriving at Post 1, wait one minute (minimum) before beginning your survey. This will allow most frogs and toads to return to their calling after your approach. Remain quiet, listen for 3 minutes, recording a call index for each species heard. Also note any frogs and toads that are seen. If traffic noises, etc. make it difficult to hear, continue listening for an additional 2 minutes (5 total).

Fixed-point or permanent monitoring stations are particularly useful in bringing us information about species which may not be encountered in the roadside surveys; for instance, places which may not be accessible to a roadside survey. To monitor population stability, it is necessary to follow breeding activity at sites where the species is known to occur. Likewise, species which are "explosive" breeders, such as the Eastern spadefoot toad (*Scaphiopus holbrookii*) often gather suddenly to breed in temporary pools formed after a rainstorm. But fixed-point surveys also give good information about even the most common species and help "fill in the gaps" left by roadside counts.

Permanent monitoring stations consist of wetlands as defined for roadside counts, and include a variety of sites such as; backwater sloughs from rivers or creeks, vernal (temporary) pools (which are important especially to frogs requiring fish-less waters), wet meadows, and woodlands. A wetland for this purpose must contain still or slowly moving water but the site does not necessarily need to be wet year-round. Some of the best breeding sites are temporary pools.

To monitor a fixed point or permanent station, arrive at your site before sunset then begin one-half hour after sunset. This gives you an opportunity to report on air temperature, cloud cover, and other variables before all light is gone and minimizes disturbance during arrival. Continue for another half-hour to one hour after start time.

IV. Data Analysis and Reporting Procedures

As indicated in the NAAMP, calling-count surveys should; Provide early warning of declines in population size or occurrence of anurans; Promote public involvement in protection of amphibians; Educate the public about amphibians; Be adaptable for studying the fluctuations and trends in local, regional, and continental anuran populations; Contribute toward separating chronic changes (especially declines) from natural fluctuations; Complement intensive monitoring and research on amphibians; and Contribute toward defining the environmental stressors that affect amphibian populations.

Data sheets and maps will also be sent to the regional coordinator for your area or the statewide coordinator in Middle Tennessee:

WEST TENNESSEE

Regional Coordinator: Alan Peterson
Tennessee Wildlife Resources Agency
State Office Building
225 Martin Luther King Boulevard
Jackson, TN 38301
(800) 372-3928
(901) 423-5724
E-mail: apeterson@mail.state.tn.us

V. Management Action Thresholds

Sudden declines or increases within the area population can used as an indicator of habitat changes. To determine the cause of the change, research could be done on habitat gains or losses, food availability, air and water quality, hunting pressure, pollution, diseases and parasites

VI. Data Storage Procedures

Copies of all data will be stored in a database management/GIS system. Observation records will be filed in the refuge files under WILDLIFE - Amphibians. Computer data files are being developed by refuge staff at this time. Computer files will include all data from the data sheets and will be stored with the capability to import and export into an Ansi format.

VII. Special Considerations

In response to these declines in North America, an international group of biologists created the North American Amphibian Monitoring Program (NAAMP), with the goal of providing reliable methods of monitoring our native amphibians. The TAMP is being undertaken in an effort to understand the status of amphibians in this state. The TAMP will be an integral part of this larger effort while expanding the scope of the surveys to suit special needs in Tennessee.

VIII. Literature Citations

N/A

IX. Effort and Costs

Personnel (3.0 staff days)	$501
Equipment	$ 75
Other Supplies	$ 75
Total	$651

Survey Procedure Form

Service Unit: Reelfoot and Lake Isom National Wildlife Refuges
Reporting Office : Reelfoot National Wildlife Refuge Complex
Procedure Number: 15
Species: *Lymantria dispar* (Gypsy Moths)
Title: Male Gypsy Moth Trappings
Survey Type: IV

I. Justification and Objectives

The gypsy moth is the primary defoliator of hardwoods in the Northeastern United States. Oaks are the preferred host species but most species of trees and shrubs are defoliated by the gypsy moth. The potential spread of this insect is extremely high. Some areas of the seacoast states are infested with this insect and eradication is eminent. Careful monitoring of these insects is crucial in the management and success of hardwood forest.

II. Statistical Considerations

To accurately identify the trapping of this species, all suspect specimens must be carefully packaged and mailed to the Forest Health Center for analysis.

III. Data Collection Procedures

In the spring of each year, the US Department of Agriculture, Forest Health Center mails new traps along with the data record sheets to each station. The traps contain male attracting pheromones which must be fresh. The traps are to be placed at the same three locations each year. The traps are attached to the side of a tree approximately 5 ½ feet above the ground. The location must be easily accessible to inspect the traps. A map of the locations is kept on file for future reference. After the traps are set, the appropriate data is recorded. The pink copy of the trap record sheet and a copy of the map is mailed to address listed within that year's mailing. The traps are then checked at least twice during the trap period with the final trap check conducted during the last week of August. During a trap inspection, record the appropriate data on the data sheet. If a trap contains a suspect specimen, the trap must be sent to the Forest Health center for verification. In September, complete the data sheet, maintain the yellow copy for station records, and send the white sheet and any suspect traps to the Forest Health Center. All other traps should be taken down and discarded. An example of a gypsy moth trap reporting form is included as Exhibit O.

IV. Data Analysis and Reporting Procedures

All data is processed and analyzed by the Forest Health Center. After compiling the data, a results reported is mailed to each trapping station.

V. Management Action Thresholds

N/A

VI. Data Storage Procedures

All data sheets and reports will be filed in the refuge files under WILDLIFE - Gypsy Moth Trapping.

VII. Special Considerations

N/A

VIII. Literature Citations

N/A

IX. Effort and Costs

Personnel (1.5 staff days)	$250
Equipment	$ 25
Other Supplies	$ 25
Total	$300

EXHIBIT O

GYPSY MOTH TRAP RECORD

National Forest/Agency: REELFOOT NWR USFWS District/Facility: REGION 4

State: TN Trapping Year: 2001 Trapper's Name: DEISHA STAMPLEY Phone No. 731-538-2481

Trap # 1 Date Set: 6 / 1 (mo / day) County: OBION

Coordinates — Latitude: 36 12 7 166 deg sec min Longitude: 89 11 8 167 deg sec min or UTM's: Easting ____ Northing ____ Zone ____

Recreation Area: VISITOR CENTER PARKING LOT

Directions to trap: OPENING OF BACKYARD HABITAT

TRAP Date	CHECKS # male moths
7/5	0
8/2	1
8/31	1
/	
Total	2

Trap # 2 Date Set: 6 / 1 (mo / day) County: OBION

Coordinates — Latitude: 36 12 7 192 deg sec min Longitude: 89 11 8 185 deg sec min or UTM's: Easting ____ Northing ____ Zone ____

Recreation Area: VISITOR CENTER PARKING LOT

Directions to trap: TOP OF MOUND W/IN CIRCLE DRIVE

TRAP Date	CHECKS # male moths
7/5	0
8/2	0
8/31	1
/	
Total	1

Trap # 3 Date Set: 6 / 1 (mo / day) County: OBION

Coordinates — Latitude: 36 12 7 174 deg sec min Longitude: 89 11 8 222 deg sec min or UTM's: Easting ____ Northing ____ Zone ____

Recreation Area: VISITOR CENTER PARKING LOT

Directions to trap: ____

TRAP Date	CHECKS # male moths
7/5	0
8/2	0
8/31	4
/	
Total	4

Submit pink copies when trap is set.
Submit white copies after final trap check.
Keep yellow copies for your files.

Submit to: USDA Forest Service, FH
P. O. Box 2680
Asheville, NC 28802
(704) 257-4846

Survey Procedure Form

Service Unit:	Reelfoot and Lake Isom National Wildlife Refuges
Reporting Office :	Reelfoot National Wildlife Refuge Complex
Procedure Number:	16
Species:	King Rails (*Rallus elegans*), Clapper Rails (*Rallus longirostris*), Virginia Rails (*Rallus limicola*), Soras (*Porzana carolina*), Black Rails (*Laterallus jamaicensis*), Yellow Rails (*Coturnicops noveboracensis*), American Bitterns (*Botaurus lentiginosus*), Least Bitterns (*Ixobrychus exilis*), Pied-billed Grebes (*Podilymbus podiceps*), American Coots (*Fulica americana*), Purple Gallinules (*Porphyrula martinica*), and Common Moorhens (*Gallinula chloropus*)
Title:	North American Marsh Bird Monitoring
Survey Type:	IV

I. Justification and Objectives

The amount of emergent wetland habitat in North America has declined sharply during the past century (Tiner 1984). Populations of many marsh birds that are dependent on emergent wetlands appear to be declining (Tate 1986, Eddleman et al. 1988, Conway et al. 1994), but we currently lack adequate monitoring programs to determine status and estimate population trends. Marsh birds include all species that primarily inhabit marshes (i.e., marsh-dependent species). The U.S. Fish and Wildlife Service has identified Black Rails, Least Bitterns, and American Bitterns as species of special concern because they are relatively rare and we lack basic information on status and trends in most areas (U. S. Fish and Wildlife Service 1987). Many U.S. states consider these species threatened or of special concern for similar reasons. King Rails are federally endangered in Canada and Black Rails are federally endangered in Mexico. Because rails and bitterns consume a wide variety of aquatic invertebrates, populations may be affected by accumulation of environmental contaminants in wetland substrates (Odom 1975, Klaas et al. 1980, Eddleman et al. 1988, Gibbs et al. 1992, Conway 1995). Marsh birds are also vulnerable to invasion of wetlands by purple loosestrife (*Lythrum salicaria*) (Gibbs et al. 1992, Meanley 1992). Hence, marsh birds represent "indicator species" for assessing wetland ecosystem quality, and their presence can be used as one measure of the success of wetland restoration efforts. Marsh birds also have high recreational value; many species are highly sought-after by recreational birders. Finally, several rails are game species in many states yet we lack responsible population surveys on which to base harvest limits. Numerous federal agencies are cooperating to monitor marsh bird populations in North America to estimate population trends. Continued monitoring will allow resource managers to evaluate whether management actions or activities adversely impact wetland ecosystems. Any management action that alters water levels, reduces mudflat/open-water areas, alters invertebrate communities, or reduces the amount of emergent plant cover within marsh habitats could potentially affect habitat quality for marsh birds (Conway 1995).

II. Statistical Considerations

Population trend is the percent annual change in population size for each species. Estimates of population trend allow managers to determine whether local or regional marsh bird populations are declining. Managers can establish *a priori* population trend thresholds or trigger points below which immediate management action will be taken. Such actions can prevent local extinctions by identifying population problems before they become severe. Population trends of marsh birds will be determined by using

weighted linear regression to analyze annual changes in the number of individuals detected per survey point. Few estimates of marsh bird population trends currently exist, and reliable estimates of population trends will probably require >5 years of survey data.

Trends in emergent habitat availability will also be estimated. Trends in habitat availability are the percent annual change in the amount of each major wetland habitat type. Information on emergent habitat availability will allow managers to: 1) extrapolate density indices to estimate total numbers of marsh birds within a local area, 2) correlate changes in marsh bird numbers with changes in habitat availability to identify potential causes of observed population changes (Gibbs and Melvin 1993), 3) identify emergent habitats that need protection, and 4) design management actions in ways that either improve or minimize adverse effects to preferred habitat of marsh birds.

III. Data Collection Procedures

Surveys will be conducted in all freshwater emergent marshes within the Reelfoot and Lake Isom NWR's. By sampling "all emergent marshes within the refuges" observers will have to add survey points as emergent habitat increases or shifts within their defined management area. Once the survey area is selected, it will be marked with GPS and mapped in Arcview. All marsh patches within the "survey area" must be surveyed each year. As location of marsh patches in the "survey area" change annually, additional survey points must be added to ensure that all marsh patches are surveyed (but no survey points are ever 'dropped' from the survey). Survey routes should include as many survey points as needed to cover the area of interest (survey area). Cooperators initiating a survey should attempt to include a minimum of 15 survey points in their survey area.

Fixed, permanent survey points will be chosen and marked with inconspicuous markers in the field. Once the survey area is selected, and a map of the survey area is available, the participant should choose the initial survey point randomly based on all possible locations for a survey point (all possible marsh-upland interfaces and all possible marsh-open water interfaces). Subsequent survey points should be at regular intervals of 400m. Survey points in ponds should be located either on the upland-emergent interface or on the open water-emergent interface, whichever will allow easier access and travel between survey points. Some marshes may be more effectively surveyed by boat (with survey points on the open water-emergent interface) and others more effectively surveyed on foot (with survey points on the upland-emergent interface). Many local marsh bird survey efforts place survey points at the interface between emergent marsh and upland. This approach minimizes travel time between adjacent points, reduces trampling vegetation within the marsh, and may increase the distance at which observers can hear vocalizing birds due to increased elevation relative to the marsh vegetation. Each survey point receives a unique identification number. The number of survey points in each survey area will be correlated with amount of emergent marsh patches within that survey area. Points should be in a 400m grid system in larger marshes (hence, 1 point per 16 ha of marsh). In many locations, emergent habitat occurs in small patchy marshes less than 16 ha in size. Include at least one survey point in all marshes >0.5 ha within the management area. Additional survey points can be added in small marsh patches as long as they are 400m away from other survey points. If new marsh patches appear in future years in areas within the survey area that did not have emergent marsh previously and did not have survey points, additional survey points can be added (provided that they are $\geq$400m from existing survey points). Original survey points are never dropped from the survey and are always surveyed in subsequent years. If no appropriate marsh exists at an original survey point, then the observers still make an entry for that point but write in the comments ('Veg') column "no survey conducted because no longer appropriate habitat".

Survey routes can be either morning or evening survey routes. Observers can conduct either morning or evening surveys on a route as long as each survey route is surveyed during the same period (morning or evening) consistently each year (once a route is designated an evening route, it will always be an evening route). Morning surveys begin 30 minutes before sunrise (first light) and must be completed by 11:00 am. Evening surveys begin 4 hours before sunset and must be completed by dark. Including both morning and evening surveys into a standardized monitoring protocol will provide added flexibility and more potential survey hours for field personnel. Conduct at least 3 surveys annually during the presumed peak breeding season for all primary marsh birds in your area. Each of the 3 replicate surveys will be conducted during a 10-day window, and each of the 10-day windows will be separated by 7 days. Seasonal timing of these 3 replicate survey windows will vary regionally depending on migration and breeding chronology of the primary marsh birds breeding in your area. The first survey should be conducted when migratory passage is over, but prior to breeding. The intent is to estimate trends over time in the number of breeding adults, so it is important to complete all three annual surveys prior to the initiation of juvenile vocalizations. Three or more surveys are needed to confirm seasonal presence/absence of marsh birds in a wetland with 90% certainty (Gibbs and Melvin 1993). Three replicate surveys per year is warranted, especially in areas where personnel organizing survey times may not initially know local timing of breeding cycle. And, timing of breeding cycle differs among co-existing species of interest (e.g., American bitterns often breed much earlier than least bitterns and rails in some areas; clapper rails and king rails breed earlier than Virginia rails and soras in some areas). Finally, including $\geq$3 replicates per season will provide us with data on temporal variation in numbers counted (parameters needed to conduct reliable power analyses once enough preliminary data are available). The 3 survey windows increase our probability of conducting at least one survey during the peak seasonal response period of all primary marsh bird species in a local management area. Contact your regional non-game bird coordinator to help choose the most appropriate survey windows for your area. One observer should expect to survey approximately 10-20 survey points each morning, depending on travel times between survey points. If for some reason you can only conduct less than 3 surveys on your area, we can still use your data to estimate detection probability and to compare passive with call broadcast survey methods.

At each survey point, observers will record all primary species (rails, bitterns, and pied-billed grebe) detected during both a 5-minute passive period prior to broadcasting recorded calls, and during a period in which pre-recorded vocalizations are broadcast into the marsh. The broadcast sequence includes calls of the primary marsh bird species and is broadcast using a portable cassette tape player or CD/MP3 player. Some potential broadcast systems include: *Cassette Tape Players*: Optimus SCP-88 Stereo Cassette Player connected to Optimus AMX-7 amplified speakers (Radio Shack #14-1231 and #40-1408); or SONY Sports Series CFD-980; or Johnny Stewart Game Caller; or *CD or MP3 players*: Aiwa XP-SP90 or XP-MP3 Portable CD Player; or Panasonic SL-SX286J or SL-SX280G Personal CD Player; any of the above connected to Optimus AMX-7 amplified speakers (Radio Shack #14-1231 and #40-1408). CD or MP3 broadcast equipment will probably produce better quality sound than cassette tapes, but cost slightly more than cassette players. The recorded calls should be obtained from the Cornell Laboratory of Ornithology's Library of Natural Sounds (contact LNS at 607-254-2404). Order tapes/CDs well in advance; the Cornell Lab may require 2-3 months to fill your order. Alternatively, tapes/CDs can be obtained from Applied BioAcoustics (contact Arch McCallum at 541-434-8321). The tape/CD should include exactly 30 seconds of calls of each of the primary marsh bird species interspersed with 30 seconds of silence between each species. The 30 seconds of calls should consist of a series of

typical calls interspersed with 5 seconds of silence. For example, an entire survey sequence might look like this:

5 minutes of silence
30 seconds of calls of first primary species configured like this:
a Least Bittern *coo-coo-coo* call
5 seconds of silence
a Least Bittern *coo-coo-coo* call
5 seconds of silence
a Least Bittern *kak* call
5 seconds of silence
30 seconds of silence
30 seconds of calls of second primary species configured like this:
a Sora *per-weep* call
5 seconds of silence
a Sora *whinny* call
5 seconds of silence
a Sora *whinny* call
5 seconds of silence
30 seconds of silence
30 seconds of calls of third primary species etc.
include a verbal "stop" at end of survey interval so that observers know when to stop the tape or CD

The chronological order of calls on the tape/CD will vary with each survey area, but will always be consistent within a particular survey area. Species to include in the call broadcast is up to the individual organizing the local survey effort, and should include all species believed to be local breeders. Order of calls should start with the least intrusive species first, and follow this chronological order: Black Rail, Least Bittern, Yellow Rail, Sora, Virginia Rail, King Rail, Clapper Rail, American Bittern, Common Moorhen, Purple Gallinule, American Coot, Pied-billed Grebe. The calls used for broadcast should include the primary advertising call of each species (e.g., '*whinny*' for Sora, '*grunt*' for Virginia Rail, '*clatter*' for Clapper Rail and King Rail, '*kicky-doo*' for Black Rail, '*click-click-click-click-click*' for Yellow Rail, '*coo-coo-coo*' for Least Bittern, '*pump-er-lunk*' for American Bittern). Each individual bird detected (for primary species) during the survey period will be entered on a separate line on the field data form (see example data sheet attached). Observers should record when each individual is detected: during any of the initial 1-min passive segments, and/or during any of the 1-min call-broadcast periods. Recording all the segments during which an individual bird is detected is extremely important so that we can determine whether call broadcast is effective at eliciting additional responses for each of the primary species. These data will help determine whether or not to use call broadcast of all primary species during surveys in future years. Moreover, recording whether each individual responds during each 1-min sub-segment allows us to estimate detection probability using capture-recapture models (Farnsworth et al. 2002). Estimates of detection probability are essential for regional/national monitoring efforts so that we can determine how well the count data recorded index true population size/trends. Hence, observers must make a decision as to whether each vocalization heard at a survey point is a new individual for that point or is an individual that vocalized previously from that survey point. Observers should also estimate the distance from each individual bird to the survey point. Estimate distance to each bird when the bird is first detected (birds will approach the call broadcast so observers need to record the distance to the bird when the bird was first detected). Recording distance to each individual will allow us to estimate density for each species in each habitat type. Density indices by habitat type are useful because they allow managers to extrapolate

survey data to estimate a minimum number of each marsh bird species on their entire management area. The cassette recorder should be placed upright on the ground (or on the bow of the boat), and sound pressure should be 90 dB at 1 m in front of the speaker. Use a sound-level meter (available at Radio Shack) to adjust volume of the cassette player at the beginning of each survey. Observers should stand 2 m to one side of the speaker while listening for vocal responses. Observers should point the speaker toward the center of the marsh and should not rotate the speaker during the call-broadcast survey. If observers detect a new bird immediately after the survey period at a particular point (or while walking between points) they should record these birds in a separate column (e.g., the "*Comments*" column). Observers have the option of recording secondary species (see list attached). At each point, record the total number of each secondary species detected. Hence, individual birds of secondary species do not receive their own line on the data sheet and observers do not record detections in each of the 1-min subsegments for secondary species (see example data sheet attached). Surveys should only be conducted when wind speed is <20 km/hr, and not during periods of sustained rain or fog.

Some areas or some survey points within a survey area will have so many marsh birds detected that observers will find it impossible to record each sub-segment during which each individual bird is detected. For example, an observer may see/hear >20 coots at one survey point. In these situations, simply write down an estimate of the total number of individuals detected for that particular species during the entire survey period on one line of the data sheet (e.g., write "23 AMCO" on one line of the data sheet - see example on sample data sheet attached).

The data sheet (Exhibit Q) must be customized to each survey area depending on the number of species the surveyor includes on the broadcast sequence for their area. The number of species columns on the data sheet will differ regionally; include only those species for which call broadcast is used in your survey (see the 2 sample data sheets attached). For example, if you intend to only broadcast calls of 3 species, then you will have an 8 minute survey at each point (5 minutes of passive listening and 1 minute for each of 3 species) and will need a data sheet with 11 response columns. If you intend to broadcast calls of 5 species, you will have a 10 minute survey at each point (5 minutes of passive listening and 1 minute for each of 5 species) and will need a data sheet with 15 response columns. See the example data sheets attached. Prior to the beginning of the survey, write down the day, month, and year at the top of the data sheet. Also write the full name of all observers present during the survey. If more than one observer, write down who recorded the data and all individuals that helped identify calling birds. Write down the name of the marsh, the name of the refuge and/or management area, and other location information (distance and direction to nearest town, county, state). Write down whether this is the first, second, or third survey of the year at these points in the "Survey #" space at the top of the data sheet. Make notes of weather conditions, and whether (and when) weather changes during the course of the morning.

Upon arriving at the first survey point, write down the unique identification number of the survey point and the time. Start the survey. When a bird is detected, write the name of the species in the third column. For example, if an individual Virginia Rail calls during the first 1 minute of passive listening, put a "1" in the first column. Regardless of whether that individual calls once or many times during the first minute, you only put one "1" in the first column. If that same individual bird also calls during the second minute of passive listening, then also put a "1" in the second column. If the same individual calls during the 30 second Sora sequence, put a "1" in the column for Sora call. If the same individual calls during the 30 seconds of silence immediately following

the Sora sequence, you also put a "1" in that column. If that same individual bird calls again during the Virginia Rail sequence, you also put a "1" in the column "VIRA tape", and so on. Hence, if an individual bird is calling constantly throughout the survey period, you will have a "1" in every column for that individual. If the individual is heard and seen, put both a "1" and a "v" in the appropriate column. If you hear a call of the same species but from a different individual (or from an individual of another species), you start a new line on the data sheet and follow the same protocol just described for this individual bird. The difficulty is determining whether a call is coming from a new individual or a individual detected earlier at that survey point. Observers must make this decision without seeing the bird by using their best judgement. Follow the same procedure at subsequent survey points. If an individual detected at one survey point is thought to be an individual that was recorded at a previous survey point, write "y" in the "Repeat?" column. Be conservative when in doubt as to whether an individual bird detected at the current point was the same individual recorded at a previous point (i.e., record "y" when in doubt). The number of lines filled out on the data sheet will differ among survey points and will correspond to the total number of individual marsh birds detected at each point. If no birds are detected at a survey point, record the point number and starting time, and write "no birds" in the comment column. A sample data sheet is included as an example of what survey data might look like. Also record the level of background noise during the survey at each survey point. This information will be used as a covariant in future trend analyses because level of background noise varies spatially and temporally and influences detection probability. Categorize background noise at each point on a scale from 0 to 4 (0= no background noise, 1=faint background noise, 2=moderate background noise (probably can't hear some birds beyond 100m), 3=loud background noise (probably can't hear some birds beyond 50m), 4=intense background noise (probably can't hear some birds beyond 25m). If the observer hears a marsh bird but is unsure of its identity, the observer should write "unknown" in the Species column and record all data for this individual as described above. Make a verbal description of the unknown call in the margin. This will aid future identification.

IV. Data Analysis and Reporting Procedures

Estimates of population change in marsh bird populations on the survey area will be compared to local population changes in other parts of the region. Comparisons among other local areas in the region will allow managers to determine the importance of local wetlands to regional population health by identifying whether marsh bird populations on the management area are doing better or worse relative to other areas.

Send or email the name, address, phone#, and email address of all participants to the address below. This list will be used to disseminate information to each participant at the end of each field season and to send results of annual data analyses. An annual report should be completed each year for each site. After each season, survey data should be summarized and summaries should include the mean number of individuals detected per survey point during both passive and broadcast periods for each marsh bird species. Summaries should identify locations on the management area with seasonal concentrations of marsh birds. After several years, survey data can be used to estimate population trends of marsh birds on the management area using regression analyses. Survey data will also allow comparison of birds detected during initial passive periods and during call broadcast to evaluate the usefulness of using call-broadcast surveys to monitor marsh birds. These comparisons will allow improvement of field methods in future years. On a regional basis, estimates of population trend from areas undergoing management activities can be compared to trends from areas that have not been subject to management activities to evaluate the long-term effectiveness of management efforts.

For assistance obtaining appropriate tapes, additional information, or questions regarding standardized marsh bird survey methods, please contact:

Dr. Courtney J. Conway
USGS-BRD
Arizona Coop. Fish & Wildlife Research Unit
104 Biological Sciences East
University of Arizona
Tucson, AZ 85721
ph: 520-626-8535
FAX: 520-621-8801
email: cconway@ag.arizona.edu

V. Management Action Thresholds

Natural changes in water level and management activities (e.g., dredging, wetland restoration efforts, prescribed burning, etc.) can lead to dramatic changes in marsh vegetation. Patterns of distribution and local population trends of marsh birds can often be best explained by local changes in wetland habitat. Consequently, quantifying the proportion of major habitat types (e.g., % cattail, bulrush, Phragmites, Spartina, Salicornia, grasses, open water, mudflat, shrub, upland) surrounding each survey point each year can help identify the cause of observed changes in marsh bird populations. Habitat will be quantified at 2 scales: observers should visually estimate the proportion of each major habitat type within a 50m-radius circle around each survey point, and aerial photographs will be used to periodically determine the amount of each major habitat type on the management area. To control for the seasonal progression of annual growth in emergent plants, observers should quantify habitat within the 50-m radius circles during their final survey each year. As an example, visual estimates of proportions of each habitat at a survey point might look like this: 15% water, 10% California bulrush, 20% three-square bulrush, 5% cattail, 20% shrubs, 10% mudflat, 20% upland.

VI. Data Storage Procedures

Field data will be manually entered in the field on a data form (see example attached) and transferred weekly to an electronic form. At each survey point, observers should record: name of observer, name of data recorder (if different from observer), name of wetland, date, survey point #, start time, species of each individual detected, the tape periods during which the individual was detected, and distance to each individual bird from the survey point. Each individual bird detected should be recorded on a new line on the data form. An overview map of the survey area with all roads and all survey points numbered on the map should be developed for field personnel conducting surveys. All data forms should be reviewed by the supervisor within 24 hours of each survey so that mistakes can be identified and corrected promptly. Copies of original data forms should be stored in two separate locations.

Data will be entered into a common spreadsheet program (EXCEL, Lotus, QuattroPro, dBase, etc) as soon after collection as possible, preferably within 1 week of data collection. Timely data entry limits mistakes, reduces probability of loss of data, and helps identify potential sampling biases and logistical problems that might be corrected in future surveys. Completed surveys will be printed out after entry into the spreadsheet and compared to original data forms to assure data quality. Electronic spreadsheets containing field data will be backed up weekly. If data entry time is not available at the

local site, send copies of the data sheets to the address below and we will enter the data for you. Submit your data promptly at the end of the field season to the address below so that regional summaries and analyses can be conducted and sent back to program participants. Also, submit a copy of the tape used during the survey effort on your area.

VII. Special Considerations

All observers should have the ability to identify all common calls of primary and secondary marsh bird species in their local area. Regularly listening to the recorded calls used for surveys can help learn calls, but observers should also practice call identification at marshes (outside the intended survey area if necessary) where the primary species are frequently heard calling. All observers must pass a self-administered vocalization identification exam each year prior to conducting surveys. This exam should be a sequence requested from Cornell Laboratory of Ornithology's Lab of Natural Sounds. Observers should not have heard the exam tape prior to taking the exam. All observers should also be trained to accurately determine distance to calling marsh birds (place a tape recorder in the marsh at an known distance and have observers estimate distance), and to identify all species of emergent plants on the management area.

VIII. Literature Citations

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IX. Effort and Costs

Personnel (6 staff days)	$1,000
Equipment	$ 200
Other Supplies	$ 50
Total	$1,250

EXHIBIT Q

Date:
Marsh/Quad:
Observer:
Survey#:

Temperature:
Wind speed:
Cloud Cover:
Precipitation:
Tape used:

Calls:
LEBI: coo, kak, other
CLRA: cltr, kburr, kek, khurrah, other
VIRA: grunt, ticket, kicker, other
SORA: whinny, perweep, keep, other

*put an 's' in appropriate column if bird was seen but not heard, '1s' if bird was seen and heard
Veg = % TYDO, SCCA, SCOL, PHRG, TACH, BACC (seepwillow), TESS (arrowweed), PLUC (fleabane), DISP (saltgrass), POFR (cottonwood), SHRB, WATER, UPLAND within 50m

sta #	GPS	time	Species	Responded During:											calls	repeat?	distance	Veg
				pass 1st	pass 2nd	pass 3rd	pass 4th	pass 5th	30 sec LEBI	30 sec silent	30 sec SORA	30 sec silent	30 sec VIRA	30 sec silent				

III. CALENDER

This calender represents estimates of staff days per month.

Procedure	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Winter Waterfowl Survey	2											2	4
Aerial Waterfowl Survey	1											1	2
Wood Duck Production	2	4		6	6	6	6	6				1	37
Wood Duck Banding						1	8	8	8				25
Goose Collar Observations	4	1										4	9
International Shorebird Survey								.5	.5				1
Bald Eagle Mid-Winter Survey	1												1
Deer Herd Inventory											12		12
Turkey Survey				1									1
Bluebird Production Survey					2	2	2	2	2				10
Christmas Bird Count	.5												.5
American Breeding Bird Survey					2								2
Point Count Surveys			2							2			4
Amphibian Monitoring			.5	.5	.5	.5	.5	.5					3
Male Gypsy Moth Trapping						.5	.5	.5					1.5
NA Marsh Bird Monitoring			2	2	2								6
Total	**11.5**	**5**	**4.5**	**9.5**	**12.5**	**10**	**17**	**17.5**	**10.5**	**2**	**12**	**8**	**119**

IV. SUMMARY OF ANNUAL INVENTORY/MONITORING EFFORTS

Procedure	Personnel	Equipment	Other Supplies	Total	
Winter Waterfowl Survey	$ 910	$ 450	$ 100	$ 1,460	
Aerial Waterfowl Survey	455	728	100	1,283	
Wood Duck Production	5,734	1,850	550	8,134	
Wood Duck Banding	4,175	1,000	288	5,463	
Goose Collar Observation	1,503	100	100	1,703	
International Shorebird Survey	167	50	10	227	
Bald Eagle Mid-Winter Survey	455	500	0	955	
Deer Herd Inventory	2,592	75	50	2,717	
Turkey Survey	167	25	10	202	
Bluebird Production Survey	1,710	20	175	1,905	
Christmas Bird Count		86	20	25	131
American Breeding Bird Survey	334	100	100	534	
Point Count Surveys	668	100	100	868	
Amphibian Monitoring	501	75	75	651	
Male Gypsy Moth Trapping	250	25	25	300	
NA Marsh Bird Monitoring	1,000	200	50	1,250	
Total	**$20,707**	**$ 5,318**	**$1,758**	**$27,783**	

V. ADDITIONAL INFORMATION

These surveys are conducted in cooperation with the following volunteers, local, state, and federal agencies:

Friends of West Tennessee National Wildlife Refuges
Migratory Bird Field Coordinator
United States Bird Banding Office
Lower Mississippi Valley Joint Venture Office
Canadian Wildlife Service
Kentucky Department of Fish and Game
Tennessee Wildlife Resource Agency
National Audubon Society
Tennessee Valley Authority
United States Geological Survey, Patuxent Wildlife Research Center
United States Geological Survey, North American Amphibian Monitoring Program
United State Department of Agriculture, Forest Health Center

VI. REVIEW AND APPROVALS

Prepared by: Refuge Operations Specialist

Reviewed by: Refuge Manager

Approved by: Project Leader

Approved by: WHM Biologist

Approved by: Wildlife and Habitat Division Supervisor

Approved by: Refuge Supervisor

Approved by: Chief , Division of Refuges